Plastics, Leather and Footwear

Health and Safety 1976-82

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First published 1983

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ISBN 0 11 883723 0

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Foreword

This report reflects the main interests, concerns and activities of the National Industry Group (NIG) responsible for safety and health in the plastics processing, footwear and leather industries since its inception in 1976.

Each of the NIGs attached to the Factory Inspectorate's 21 operational areas is responsible for developing appropriate standards of safety and health and promoting their consistent implementation throughout the industries or sectors of employment for which it is responsible. It is axiomatic that these standards should be produced and promoted in close conjunction with appropriate employers' organisations, trade unions and other significant bodies. Such an approach is also designed to foster 'self regulation' at industry level as encouraged in the Robens Report on health and safety at work.

In the climate created by this concept and the Health and Safety at Work Act it is important that health and safety standards should not merely be accepted passively by workpeople, but that they should, through relevant trade unions, contribute positively towards those standards. Perhaps the most important objective of the NIG since its inception has been to encourage such trade union input to safety and health matters and to promote effective tripartite arrangements in which employers, trade unions and the Health and Safety Executive (HSE) can engage in effective co-operation to improve safety and health in the three industries.

From the point of view of industrial safety the outstanding feature of all three of these industries is their use of power-driven machines by individual operatives. Not surprisingly this has given rise to a significant history of personal accidents.

Apart from the long standing work of the British Plastics Federation (BPF) on the more common plastics processing machines, little had been done at industry level before the advent of the NIG to develop appropriate standards of machinery safety or even of basic guarding. The position was particularly unhappy in the leather and footwear industries where problems arising from the wide, and sometimes bewildering, range of machines are frequently compounded by practical difficulties in achieving the 'secure fencing' long required by the Factories Act.

In these circumstances the NIG's first approach towards the two older industries was to encourage the development of standards of machinery safety which would be both acceptable to, and accepted by, individual companies and their employees. Commendable progress has since been made in both the leather and footwear industries towards dealing with their more dangerous machines. Meanwhile the plastics industry, mainly through the good offices of BPF, has progressed on a broader front towards implementing the concept of 'self regulation'.

In considering what has so far been achieved it is noteworthy that the greatest progress towards such arrangements has been in the footwear industry where nothing effective existed at industry level before the advent of the NIG. It is gratifying to see that there is now a very progressive joint industry safety committee organised on a tripartite basis and efficiently run by the industry's own Shoe and Allied Trades Research Association (SATRA).

Perhaps understandably there was more reluctance by employer interests in the plastics industry to forego their traditional productive partnership with HM Factory Inspectorate in favour of broader arrangements which include trade union participation. Nevertheless a satisfactory mechanism for co-operation on a tripartite basis does now seem to have been successfully developed from the pre-existing BPF structure. The trade unions operating in this industry are now making a positive and constructive contribution to safety and health.

The position was until recently much less satisfactory in the leather industry where the major employers' organisation, while agreeable to 'ad hoc' trade union participation in particular projects, was slow to modify its standing safety and health arrangements to include participation by trade unions and HSE on a tripartite basis. Since the beginning of 1982 such a liaison committee has however been set up. The value of such a body to facilitate development and acceptance of realistic standards of health and safety is particularly crucial in view of the recent general economic climate and specific difficulties of the leather industry. With the limited resources available in this and other industries it is clearly important to concentrate on a cost effective approach towards safety and health. At the same time it is essential that those whose working conditions will be affected by such an approach should be party, through their trade unions, to decisions on priorities. It is the experience of those industries which have long involved the trade unions in their top health and safety committees that their contribution is invaluable, not least in the fact that it is then known by safety representatives and those on the shop floor that the published standards and advice have been prepared with the help and agreement of their own officials. I am confident that this new liaison committee will provide a fresh stimulus to the solution of the leather industry's long standing and also newly emerging problems.

One aspect of this report which I note with safisfaction is that even in such machinery-intensive industries work is being done in occupational hygiene groups as well as on mechanical safety. The reduction of long-term risks to health is not a dramatic process but sustained interest and effort are sometimes quite literally of vital importance.
An approach currently being urged by the NIG is that greater attention should be paid at industry level to

publicising the value of 'safe systems of work' required by Section 2 of the Health and Safety at Work Act. Reducing the number of accidents by improved control of human activity is much less easy than the traditional approach of protecting plant, equipment and the physical environment. However the development of such safe systems of work by individual companies, either in support of machinery guarding or generally to reduce the hard core of accidents arising from handling and transport of materials, poor housekeeping and the like could be particularly attractive at present. By and large this approach is not expensive in capital costs though it does require the exercise of realistic self-appraisal, foresight and even ingenuity on the part of management, supervisors and workpeople alike. I am sure however that these qualities are not lacking in the industries to which this report relates and I commend such an approach here as I have already done elsewhere.

J D G HAMMER
HM Chief Inspector of Factories

Introduction

National Industry Groups (NIGs)

1 When the Report of the Robens Committee on Safety and Health at Work (1972, Command 5034) was published, two of its recommendations were that the Inspectorates of the enforcing authorities should be re-organised to permit a higher degree of industry specialisation and that industry and trade unions should play a greater part in the specification of technical standards relating to statutory requirements in the field of safety and health.

2 One of the ways in which HM Factory Inspectorate (HMFI) responded to these two recommendations was by the setting up of National Industry Groups with responsibility for particular sectors of industry.

3 The National Industry Group (NIG) based at Northampton in the East Midlands Area of the Health and Safety Executive (HSE) was given responsibility for the footwear, leather and plastics processing industries. This span of interests has provided useful insights into the variations in response between different industries to the Robens Report recommendations that industries should become more 'self-regulating' in matters of health and safety.

4 Each of the industries has a well established sense of identity which is sustained by the activities of an active trade federation and other institutions such as industrial research and educational bodies. In each case there is a wide awareness of and discussion about common interests in the commercial, technical and legal fields. It has been very noticeable that the plastics processing industry on the one hand and the footwear and leather industries on the other have adopted quite different approaches to the issues of safety and health at work.

Plastics

5 The plastics industry is a comparatively recent, science-based industry which is in a state of constant technical development. Its history of accident and ill health is not an alarming one, but this has been due more to the maintenance of reasonably good standards of control than to an absence of potential for mishap. Although it is by far the youngest of the three industries its formal initiatives in the fields of safety and joint activities with HMFI are the longest established.

6 At about the time that the Health and Safety at Work etc Act (HSW Act) came into force the British Plastics Federation (BPF) formed a new health and safety committee in order to consider what action the industry needed to take in order to achieve the purposes of the Act. This committee took responsibility for a programme of preparation of technical guidance in the health and safety fields, and subsequently efforts were made to establish the kind of tripartite collaboration between trade unions, employees and the HSE advocated by the Robens Report. After early difficulties a tripartite system was established and has continued to operate very effectively.

Footwear and leather

7 The footwear and leather producing industries are of course very old. They are traditional craft industries and have undergone only slight degrees of technical development over many years. The most typical development has been the mechanisation of manual operations rather than any fundamental revision of manufacturing processes.

8 The footwear industry within the UK has been declining in size over recent years largely because of foreign competition. The trade association of the industry is a small one and has limited resources at its disposal. The incidence of serious accidents in the industry is small. For all these reasons the industry was at first rather passive in its approach to the new philosophy of self-regulation. However, following some encouragement by the HSE, and by a number of prominent people within the industry itself, a tripartite health and safety committee was formed and given very competent administrative and secretarial support by the Shoe and Allied Trades Research Association (SATRA). Despite its perhaps reluctant start, this committee, once formed, received excellent service from its members and is producing work of real value to the industry.

9 Leather producing is the oldest of the three industries and because it is a by-product industry it is difficult to envisage circumstances in which it would not exist in some form. Much of the plant in use is crude in terms of technological principle but powerful and capable of inflicting fatal or seriously disabling injuries. Until recently the industry has been reluctant to consider a thorough-going system of self regulation; it has been disposed to take action only on specific suggestions from HSE and to avoid participation in any kind of standing deliberative body. However, in fairness it must be said that once a particular area of concern has been agreed the members of tripartite working groups have dealt with the issues effectively and expeditiously.

Division of resources between safety and health

10 When the NIG was set up it took over responsibility from other parts of HMFI for partially completed codes of practice in the field of safeguarding of machinery. Consequently for the first four years it was concerned more with issues of mechanical safety

than occupational hygiene. Mechanical safety is undoubtedly an important subject. Despite the fact that over many years a great deal of effort and money has been spent on the safeguarding of machinery, the number of machinery accidents is still high. In recent years HMFI has been notified annually of approximately 30,000 machinery accidents, which represent about 15 per cent of the annual total of notified accidents in all factory processes under the Factories Act.

11 However, while not discounting the importance of mechanical safety it is not difficult to see why the subject might attract a disproportionately large share of limited resources. The risks from machines are more immediately obvious, in most cases practicable solutions can be devised and, once applied, they usually require only modest costs for their maintenance. Consequently it is relatively easy to recognise when a proper balance has been struck between cost and benefit. The issues of occupational health are much less tractable. Except in the relatively small number of cases where the existence and quantification of risk is not a matter of controversy there is scope for wide but honest differences in medical opinion. Control of possibly harmful substances requires continuing attention which can involve substantial costs. When the scale of risk is not established beyond argument decisions about the dedication of resources to control are more difficult.

12 The existence of such difficulties does not, however, excuse suppliers and users of substances from their duties under Section 2 or Section 6 of the Health and Safety at Work Act properly to appraise the potential risks and to advise upon and observe the appropriate precautions. There would seem to be a need in these industries for greater concern with matters of occupational health.

General

'Reasonable practicability'

13 It was intended that the objectives of the HSW Act would be achieved by the progressive replacement of a multiplicity of existing statutory provisions by new regulations and codes of practice. While many of these statutory provisions imposed obligations that were absolute in legal terms the new Act made extensive use of the concept of 'reasonable practicability'. This change of emphasis was widely welcomed within manufacturing industries because it would allow issues of safety, health and welfare to be settled with a more realistic regard to the difficulties and costs of establishing adequate precautions. In assessing the extent of a duty qualified by reasonable practicability a balance has to be struck between the quantum of risk on one hand and the cost in terms of effort and money necessary to minimise or eliminate that risk on the other. Where the cost greatly exceeds the risk then the duty is regarded as being satisfied.

14 Unfortunately in the experience of the footwear, leather and plastics processing NIG the concept of reasonable practicability is very often misunderstood, being more often interpreted as 'reasonably convenient'. Furthermore, it is not sufficiently widely realised that the pre-existing duties have not been superseded.

15 Those duties imposed by Sections 12-17 of the Factories Act 1961 relating to the safeguarding of dangerous machinery, themselves re-enactments of earlier requirements, are still in force and therefore the law relating to the fencing of machinery remains what it has been for many years. As interpreted by the Courts over the years, Section 14 of the Factories Act 1961 requires machinery to be guarded when it is a reasonably foreseeable cause of injury to a person acting in a way that a person may reasonably be expected to occur. Over the years the courts have concluded that a wide range of careless, stupid, reckless, and seemingly irrational acts are in fact 'reasonably foreseeable'. Where danger is foreseeable in these terms the legal position is that secure fencing is required without taking account of cost and difficulty. In practice HM Factory Inspectorate does get involved in the discussion of what is reasonably foreseeable, in the assessment of what constitutes secure fencing in any particular case and in phasing in improvements. Even where the duties are limited by reasonable practicability this standard is more rigorous than is sometimes believed since a court is likely to require some convincing that significant expenditure is not justified where there is a serious risk of injury.

Influence of overseas legislation, etc

16 Complaints are regularly made to the NIG that the legal duties imposed by occupational health and safety legislation put British manufacturers at a trading disadvantage.

17 This complaint takes a variety of forms. Some British machinery manufacturers claim that many foreign machines are supplied with inadequate safeguards and that the economies effected by such deficiencies allow the foreign machines to be sold at much lower prices. Other plant manufacturers say that British requirements are too specific and that because foreign competitors do not observe standards of safety etc comparable to those of Britain they derive an unfair benefit in reduced operating costs. It is commonly believed that the disparity arises in two ways. First that in many countries the legal duties are much less severe and second that in countries where the legal obligations are of a similar standard to those of British enforcement of the standards is less rigorous.

18 There is no doubt that a proportion of the complaints is factually correct, although it is demonstrably untrue that all foreign manufacturers have lower standards of health and safety than their British counterparts. Furthermore other Inspectorates in other countries receive similar complaints from their manufacturers.

19 Generally the attitude taken by British industry is not that British standards should be reduced but that pressure and influence should be applied when necessary to foreign countries to achieve an improvement in their standards.

20 In Britain the standards at which we arrive are generally accepted and practised by suppliers, users and enforcing authorities. The HSE can and does exert an influence in international committees; and in all the ways open to it advocates the adoption of standards which reflect good British practice. The effectiveness of the enforcement agencies in foreign countries is not directly susceptible of influence by the British Government since they are soveriegn states. Representations are made when there appear to be obvious failures of enforcement, but for a number of reasons opportunities for such action have been rare.

21 British importers of foreign machinery are subject to the requirements of Section 6 of the HSW Act to design and produce equipment which is safe and periodic visits are made to such importers to advise them of the nature of these duties. Special visits are also made to look into cases of apparently inadequate safeguarding, discovered by Inspectors in users' premises. Thus the Inspectorate builds up a comprehensive picture of the existence and activities of importers and also directly enforces the requirements of Section 6. In 1980, in industry as a whole, approximately half the notices and prosecutions under Section 6 of the HSW Act were in respect of articles and equipment manufactured abroad.

22 A further influence in this area is that UK companies which import machines often belong to trade associations and such associations often participate in industry-wide safety initiatives. A good example of this was the membership of the working group which prepared the British Plastics Federation Code of Practice for the Safeguarding of Horizontal Plastic Injection Moulding Machines by a representative of the Plastics Machinery Distributors Association (PMDA).

23 As a step towards the eventual aim of harmonised standards in the European Economic Community there is a recent example of a draft standard on compression moulding machines for the plastics industry being offered by the BPF as the basis for a European standard. If we believe that British safety standards are high then initiatives such as this are to be encouraged. But, the paths towards European standards and directives are long and often tortuous and in the meantime we must continue to make progress with realistic and authoritative standards in this country.

Information role of NIG

24 In a sense the essence of the work of this NIG has been that of the exchange of information. It has had to acquire information about the peculiar conditions and problems of its industries and has done this directly by contact with representative parts of the industry and indirectly from the reports and observations of other parts of HMFI, agencies such as learned institutions, research organisations, the trade press, and Government Departments, etc. It has had to give to its industries information about the law and developments in health and safety techniques. It has attempted to keep other parts of the HSE informed about developments, and to advise on specific cases in relation to overall standards and developments. This is particularly the case in relation to inspection procedures, where effective and ready communication and training within HMFI is a considerable influence towards consistency of standards of enforcement.

25 This two-way flow of information is important, too, in removing misapprehensions about codes of practice. Many industrialists have tended to regard codes of practice as being extensions of legal requirements, and a minority of them have gone on to argue that it is imprudent for an industry trade association to help in the preparation of codes of practice since by so doing avoidable burdens are placed upon hard pressed manufacturers.

26 In fact, of course, such codes are not themselves legal documents. They are informative and intended to

provide illustrations of how pre-existing and often long-established legal duties may be met. Where an appropriate code of practice does not exist HMFI must still see that in each particular case legal obligations are fulfilled. Such a piecemeal approach is unnecessarily time consuming for all concerned and is much more likely to lead to inconsistencies of standards.

27 In any event where a difficulty recurs frequently, an enforcing authority merely to conserve its resources will tend to evolve a standard solution of its own. The choice which exists therefore is not one between the existence of non-existence of a code, but rather between whether a code will be prepared unilaterally or in consultation with the affected parties. One of the most encouraging features of the health and safety scene since the establishment of the HSC has been the willingness of so many industries to see the advantage of involving themselves in the process of setting standards in conjunction with the HSE and the trade unions. The positive work of several such groups is recorded in later pages of this report.

28 On the other hand it is open to any body to propose that a code of practice which it has prepared should be approved by the HSC under Section 16 of the HSW Act. If the HSC agreed that such approval would be helpful it would then undertake formal consultation as provided for in that Section.

Trade unions

29 Support of individual members in claims for compensation for occupationally caused disabilities has always been a significant activity of trade unions. Whereas in the distant past the involvement of unions in occupational health and safety was understandably reactive, in more recent times, they have become increasingly active and anxious to play a fuller part in the identification of risk. Some unions have appointed very able and well qualified full-time health and safety officers who play an influential role in the deployment of the argument that all occupational risks should be identified in ways other than by the incidence of injury in workpeople.

30 A major concern of the trade unions has been the provision of information about the materials which their members use and it is generally agreed within the industries dealt with by this NIG that prudent enquiries and research ought always to precede the use of new substances and processes. It is inescapable however, that looking to research rather than depending upon experience, which it is true has sometimes proved to be bitter, is an expensive course of action. To demonstrate that a proposed process, etc is not harmful can be as costly as exposing unknown dangers. Given the unfortunate lessons of history on one hand and the need for British industry to remain competitive in difficult trading conditions on the other, continued debate about the proper standards to be adopted in relation to the identification of dangers from processes and materials can be anticipated.

31 The problems have meant that progress towards definitive standards on hazardous materials has perhaps not been as rapid as some trade unions would have wished. The current HSC proposals for packaging and labelling of materials however, do demonstrate that progress is being made.

Enforcement

32 Appendix 1 contains tables showing formal enforcement action taken by HMFI during 1980 in the footwear, leather and plastics industries.

33 It is apparent that in these industries the number of notices issued and prosecutions taken was small in relation to total enforcement action taken by HMFI.

34 In the plastics industry the general level of compliance with legal duties in relation to health and safety is considered by the NIG to be reasonably good. Furthermore the industry has long had the advantage of clear advice from its trade federation which has resulted in a generally high level of familiarity with effective solutions. This is perhaps best illustrated by the fact that despsite the many thousands of machines in use there were only two prosecutions in respect of horizontal injection moulding machines (for which, of course, there is a recent code of practice).

35 The low figures of enforcement notices and prosecutions for the footwear and leather industries are a consequence of a number of factors. Both industries were at a reduced level of activity during the period. Both are relatively small industries and are still contracting. The footwear industry is a fairly low risk one. Familiarity with existing standards as a consequence of trade federation activities as in the case of the plastics industry is another influence towards consistency of levels of compliance with health and safety requirements.

British Plastics Federation

36 The British Plastics Federation has been involved in joint activities with HM Factory Inspectorate in the fields of health and safety since the 1930s and over the years has published a number of health and safety advisory documents.

37 In 1975 an industrial health and safety committee was formed which was very widely representative of interests within the industry. Membership of the committee included representatives of plastics processors, machinery manufacturers, raw materials suppliers, the Confederation of British Industries, and the Engineering Employers Federation, as well as of the HSE.

38 It was, however, considered that the effectiveness of the committee would be heightened by a participation in its work by trade unions, but there were a number of procedural difficulties. First the BPF is a trade federation and not an employers' association and for that reason had no established links with trade unions. Member firms of BPF often belonged as well to employers associations which customarily had negotiated with trade unions about matters such as pay and conditions of service. There were some early fears that the existing clearly defined differences of role between the trade and the employers' federation might become confused.

39 Second, the members of many different trade unions work in the plastics industry and it was by no means self-evident how a reasonably representative trade union contribution should be made. However, the difficulties were faced with energy and goodwill by all those involved and eventually a new committee known as a liaison committee was established. This is tripartite in nature and has the function of proposing initiatives and approving action with regard to health and safety matters.

40 Since its formation, the NIG has carried out little work on publications for the plastics industry otherwise than in conjunction with BPF. The usual method of proceeding has been to appoint a tripartite working group to deal with a specific subject of difficulty. So far most of the work has been concerned with machinery safety, but in 1980 a tripartite working party was formed to produce a manual of occupational hygiene in the plastics industry.

Safety of machinery

41 (a) *Compression moulding machine* (Figs 1 and 2)

Most compression moulding of plastics is carried out at hydraulic presses. The dangers associated with the use of such machines are not limited to the plastics industry and an attempt was made initially to provide general guidance. It became apparent that although the risks were much the same for all classes of machines, the safeguards which were satisfactory varied greatly in different industries. Consequently a working group was re-established to consider the appropriate safeguards in the plastics industry. The working group's draft of a code of practice was produced at the end of 1980 and circulated to trade unions and within industry and the HSE for comment. It is hoped that the draft will eventually form the basis of a European standard.

(b) *Granulating machines* (Figs 3 and 4)

Work on the preparation of a code of practice for safety in the construction and use of granulators for plastics started in 1976. The need to resolve matters of how to involve the appropriate trade unions delayed production of an authoritative final version and the document was not published until the beginning of 1981.

(c) *Rotational moulding* (Fig 5)

In 1979 a working group was appointed to produce a code of practice for the safeguarding of rotational moulding machines. This part of the plastics industry is comparatively small and so it was possible to formulate widely acceptable general principles fairly rapidly. The code was published in 1982.

(d) *Horizontal injection moulding machines* (Figs 6 and 7)

Horizontal injection moulding machines have been in use in the plastics industry for many years and there are many thousands of them in use.

They employ considerable mechanical forces and are capable of inflicting very serious and even fatal injuries if not properly safeguarded. The potentially dangerous character of the machines has long been recognised and BPF has published codes of practice illustrating methods of safeguarding.

The current code of practice was published in 1979, superseding an earlier edition of 1973. The production of the new code required considerable efforts by all those involved. Apart from the inevitable technical updating consideration had to be given for the first time to the implications of new duties imposed by the HSW Act and to the desirability of a tripartite endorsement of the standards of the code.

At first there were widely shared forebodings that the publication of the code would seriously increase costs for users, i.e. by requiring expenditure on new mechanical operating systems, etc; and by the indirect effect of reduced production. In general, experience has not shown these fears to be justified.

Many existing machines required only relatively inexpensive adaptations to meet the new engineering requirements. Guarding of the machines has of course

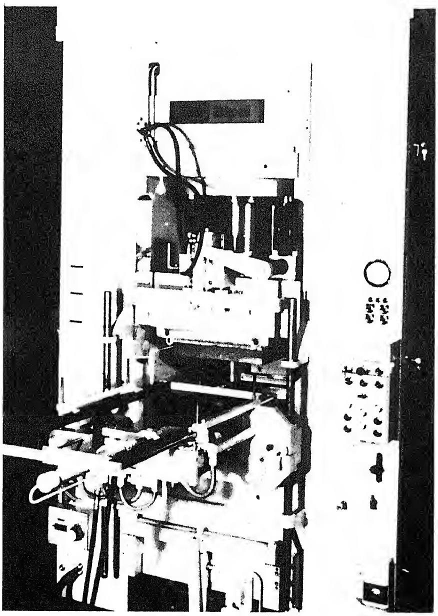

Fig 1 Unguarded compression moulding machine (para 41(a))

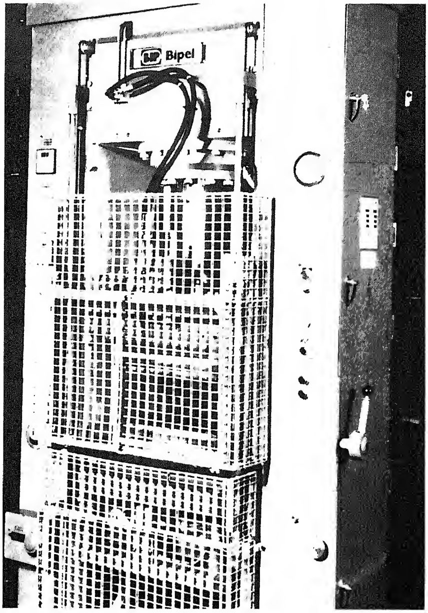

Fig 2 Full interlocked guarding at a compression moulding machine (para 41(a))

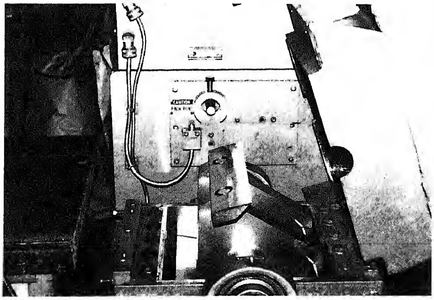

Fig 3 The blades inside a granulator (para 41(b))

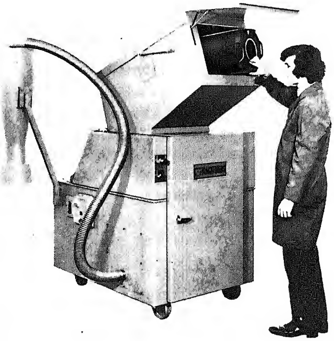

Fig 4 A granulator with full mechanical and acoustic guarding (para 41(b))

long been a legal requirement and was not introduced by the code of practice. In essence the code was concerned to improve the integrity of the engineering systems underlying the use of movable guards which had long been employed in the use of the machines. The new standards did not necessitate any significant alteration in the long-established working practices of operators. However, one provision which appeared in both the 1973 and 1979 versions of the code, namely mechanical restraint, continued to give difficulty. Mechanical restraint is intended to be a supplement to hydraulic and electrical safeguards and to prevent, by the interposition of a scotch, the closing of the moving platen as a result of a malfunction. The most obvious mishap which would not be prevented by the interlocking systems but which could be controlled by a scotch would be the failure of a piston connecting rod. In such an event hydraulic power could be exerted on the broken end and so produce an uncovenanted closure of the moving platen.

While forms of progressive mechanical restraint have been devised for smaller machines even by the end of 1980 problems at large machines still remained.

In 1980 the Polymer Engineering Directorate of the Science Research Council and the BPF asked Newcastle University to examine the difficulties of fitting mechanical restraint. They reported that on large machines the provision of satisfactory progressive restraint was not feasible, that the probability of its being necessary was low and that the problem it was most likely to be required to deal with could be eliminated by changes in design of machines. Following this report it was decided in 1981 to allow, as an alternative to mechanical restraint, measures which removed the danger by redesign of machines, for example by the provision of cross monitored high integrity interlocking systems.

The code of practice aroused and sustained technical interest amongst bodies such as the engineering inspection departments of insurance companies and specialist hydraulic engineering servicing companies. The NIG held a seminar for representatives of such bodies during 1980 in order to clear up difficulties of interpretation.

The position with regard to these machines is complicated by the development of a CEN standard. Following earlier initiatives by the European Committee of Manufacturers of Machines for Plastics and Rubber the British Standards Institute was invited to participate in the preparation of a CEN standard for injection moulding machines. The invitation was accepted and both the BPF and the HSE appointed representatives to a wider BSI committee which has taken part in discussions with representatives of other European Countries.

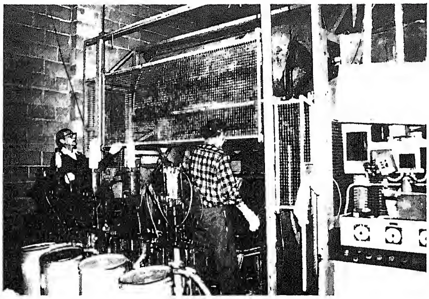

Fig 5 Rise and fall guard at a rotational moulding machine (para 41(c))

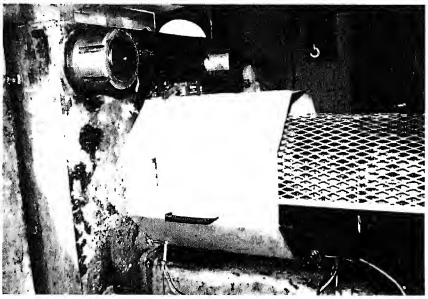

Fig 6 Injection moulding machine with a well designed nozzle guard (para 41(d))

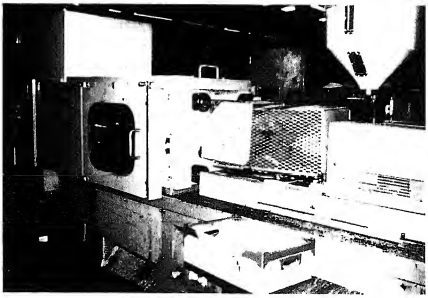

Fig 7 A typical injection moulding machine guarded to BPF Code standards (para 41(d))

(e) *Expanded polystyrene machines*

One of the exceptions to the practice of preparing codes of practice in conjunction with BPF has been in the field of expanded polystyrene machines. This part of the plastics industry supports the Expanded Polystyrene Association (EPSA) in connection with which during 1980 the first steps were taken towards the preparation of a code of practice for these machines.

(f) *Other machinery*

During the period many local safeguarding problems arose about plastic extrusion machines, plastic converting machines, vacuum forming, blow moulding, and ancillary equipment such as haul-off units and mechanical feeding devices. Such problems were dealt with on an ad hoc basis but clearly when resources permit it would be advantageous to attempt to deal with these problems on a broader basis.

Occupational health and hygiene

42 Although historically there have been a number of problems concerning occupational health arising from the production and use of plastics, few have been specific to the plastics processing industry. Because of the greater familiarity of the chemical industry with the potentially harmful effect of some plastics materials the processing industry has customarily looked to its materials suppliers for information and guidance about specific health risks from substances and the appropriate precautions. This natural dependence is of course, fostered by both civil and statutory duties owed by the suppliers to their customers. However, the processing industry did in 1979 publish general guidance on the kinds of hazards which might arise out of the use of powdered and fibrous additives. One health matter which became an issue in 1980 was that of a proposal to alter the threshold limit value (TLV) for styrene monomer, a chemical in wide use in the industry, and particularly in glass reinforced plastics (GRP) manufacture. In 1980 the HSE published a Guidance Note (EH15/79) which reproduced the 1979 list of TLVs of the American Conference of Governmental Industrial Hygienists. This document gave notice of intended changes in values, one of which was a reduction from 100 ppm to 50 ppm for styrene. The medical evidence used to justify this reduction was not accepted as conclusive by the industry and some challenge has been made to the proposal.

43 In 1980 a tripartite working group was set up to prepare guidance on matters of occupational health in the processing industry. The group started its work by preparing a document dealing with the general principles of occupational hygiene. This was published under the title "Health at Work" in 1982.

Information and education

44 (a) *Plastics and Rubber Institute*

The Plastics and Rubber Institute (PRI) is a learned institution which provides technical and professional education at management level within the plastics and rubber industries. It has a network of regional sections administered by honorary officers and occasionally local events are organised at which occupational health and safety themes are treated, sometimes with the help of HSE.

At a national level in recent years the PRI has organised two seminars expressly to deal with this subject. On both occasions HMFI were closely associated with the events. In 1978 a conference was held in Coventry and in 1980 another conference was held at Warwick University. The second conference was particularly successful, being well attended by members of senior management and having the benefit of many contributions, some of original material, by highly expert and authoritative speakers. The next PRI conference is planned for 1984.

(b) *Rubber and Plastics Industry Training Board*

Until 1980 this Board maintained a sub-committee whose function was to advise on the safety and health implications of industrial training. Two members of the sub-committee were HMFI, one from the Rubber NIG and one from the Plastics NIG. However, following the retirement of the chairman in 1979 no further meetings were held in 1979 or 1980. In 1981 the committee reformed to produce guidance on safety policies.

(c) *Trade press*

The plastics industry is well served by a trade press which clearly has the long-term interests of the industry at heart. Its material is well researched and presented with an obvious sense of responsibility. The relationship between the trade press and the NIG while not being extensive has been helpful, particularly because of the press's thorough perception of the character and problems of the industry.

Footwear

45 The manufacture of footwear is an old industry and many of the craft traditions still exist. Historically, the industry has been concentrated in certain areas, notably Northamptonshire, Leicestershire, East Anglia, Lancashire and South West England. The National Industry Group of HMFI dealing with footwear is appropriately based in the East Midlands Area of HSE where about 60 per cent of footwear workers are employed.

46 Although there has been some movement towards the use of synthetic materials as replacements for natural materials, leather is still used extensively in footwear. While very hard wearing resin and polyurethane soles are commonly found, traditional leather soled shoes are still popular, particularly in men's footwear, for which there is a significant export market.

47 Since 1977 the industry has continued to decrease in size. The impact of imports from less developed countries and eastern Europe has led to the closure of many factories. Furthermore the industry is not a high risk one nor is it strikingly innovative. For these reasons it made a cautious approach to the principle of self regulation advocated in the Robens Report. However, since the formation of the NIG there have been steady improvlements in standards in many factories, although poor standards of welfare and cleanliness in particular are still encountered. Machinery safeguarding is a particular problem in this industry which makes use of machinery highly peculiar to itself.

Joint Industry Safety Committee

48 The Joint Industry Safety Committee was set up in 1979 in response to suggestions by the NIG that an effective tripartite body ought to be established. The initiative in setting up the committee was taken by the British Footwear Manufacturers Federation which was able to call upon the Shoe and Allied Trades Research Association (SATRA) to provide the necessary administrative support.

49 Membership of the committee includes representatives of trade associations, trade unions, the footwear training board, the principal footwear machinery manufacturers, and the HSE. The committee which meets regularly, has set up small specialised groups to consider specific problems. Additional representatives were co-opted onto these working groups from appropriate sectors of the industry.

50 A number of trade unions are active within the footwear and leather industries but in terms of membership two unions are predominant; the National Union of Footwear, Leather and Allied Trades, which has a specialised leather section and the Rossendale Union of Boot, Shoe and Slipper Operatives. In these industries the same institutions function both as trade and as employers' federations and consequently there is a long-established relationship between trade unions and employers. These features have much reduced the difficulties of establishing a mechanism for arriving at agreed standards on matters of health and safety.

Revolution Press Working Party

51 Although the revolution press is not very commonly used, accidents at this machine have accounted for up to five per cent of the total accidents in certain years, and often involved amputations. However, while presenting considerable risks to the safety of the operator the use of this machine was regarded by the industry as essential for the survival in the short term of certain sections. In view of this serious conflict of interests a working party was set up to consider the problems.

52 As an immediate step to reduce accidents at this type of machine the group produced a document entitled 'Revolution Cutting Presses — A Code of Practice'. This was subsequently published and provides advice on the training of operatives, safe use of the machine, inspection and maintenance procedures and knife design.

53 The industry accepted that the continued use of the machine should eventually cease in those cases where flat material can be effectively and safely cut on different machines. Use of the revolution press for this purpose should be discontinued after July 1985.

54 A further working party has been established to consider the feasibility and viability of cutting certain problem materials such as 'belly' leather on machines other than revolution presses. The uneven and wavy nature of this type of leather causes operating problems and there are, without doubt, considerable economic problems in cutting these materials on alternative machines, both in terms of material utilisation and productivity, but it is to hoped that the development of new machines and the supply of flatter materials will remove the need for the continued use of revolution presses.

Solvents Working Party

55 A working party was set up in 1979 to consider the use of solvents and solvent-based materials within the footwear industry. The intention of the original working group was to identify and evaluate problems associated with the use of such chemicals. Preliminary readily available information on the hazards and safety meetings established that there was a lack of

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precautions associated with solvents in the industry. It was also evident that standards in many factories were unsatisfactory and employees were being exposed to solvent fumes.

56 Work began on a guidance document to provide practical advice to users of adhesives, solvents and solvent-based sprays in the footwear industry and cover: toxic risks, handling, fume control and environmental monitoring. The resulting Code of Practice, *Solvents and Adhesives,* was published in 1982 and has been very well received.

Footwear machinery

57 The most recent statistics available for the industry suggest that nearly 20% of accidents involving absences of three days or more are caused by machinery.

58 A breakdown of these machinery accidents into machine type is given below. Part of the efforts of the NIG have therefore been directed to identifying particular problem areas and attempting to improve standards of machinery safeguarding.

59 In the past the standard of mechanical safeguarding of footwear machinery has been low with considerable reliance being placed upon the skill and dexterity of the operators for the avoidance of injury. This is understandable because where visibility, access and manipulation of the workpiece are essential the provision of certain types of conventional guarding has presented considerable difficulties.

60 In general, there have been few radical changes in the safeguarding of machinery with perhaps the principal example of innovation being the very recent development of photo-electric safeguards for some machines.

61 Many machines, in particular the traditional machinery for welted footwear and similar constructions, have remained unchanged except for small gradual improvements and automation of existing machines.

62 In many industries automation provides an opportunity for the application of convenient safeguarding techniques but the process of footwear manufacture does not lend itself easily to full

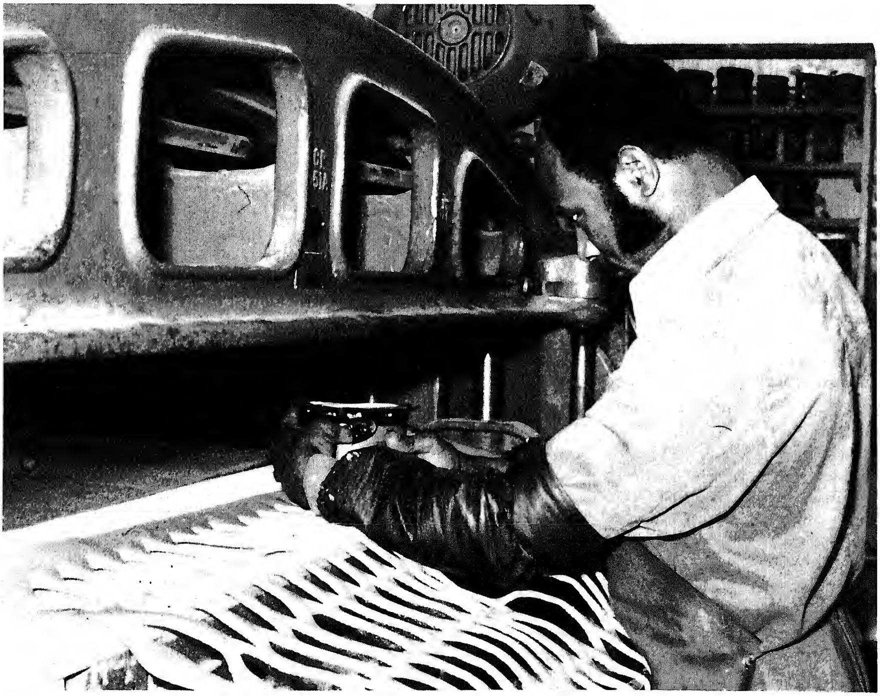


Fig 8 Revolution press being used to cut soles (para 64(a))

automation. The effect of partial mechanisation is often to reduce the skill content of the operation while still requiring such visibility and access as to make safeguarding a difficult technical problem. Such a development tends to deprive the operator of even the limited degree of safety which is afforded by skill.

63 A significant feature of the footwear industry is that the leading manufacturer of footwear machinery in Britain tends to lease rather than sell its machines to footwear manufacturers and thus retains a continuing influence over the condition of machinery. The NIG has close contacts both with this company and a number of other manufacturers and importers of footwear machinery. There has been a growing awareness of the need to reconsider fundamental safeguarding techniques although the maintenance and improvement of standards at imported machines presents many practical and technical difficulties.

Cutting presses

64 Cutting presses represent the most potentially hazardous group of machines used in the industry. The machines are used with loose knives between the material and upper platen for a variety of component cutting operations. They fall basically into three classes; (a) beam presses (including revolution presses, (b) travelling head presses and (c) swing arm presses. Because of the potential for serious injuries the NIG was involved extensively in problems associated with these machines.

(a) *Beam presses* represent a small section of the total number of presses used. Until 1980 the revolution press was virtually the only beam press used in the industry. The press is a single revolution, foot-operated press with the operator's safety depending only on good working practice. Safety flanges have been fitted on the top of loose knives for many years and knives have been designed to be held safely. Nonetheless, the need to hold the knives beneath the beam exposes the operator to considerable risk.

Prior to the publication of the Code of Practice for Revolution Presses by the Joint Industry Safety Committee the NIG had persuaded the industry to use safety flanges with increased widths. This change appears to have reduced a certain type of accident. It is expected that accidents, particularly to inexperienced

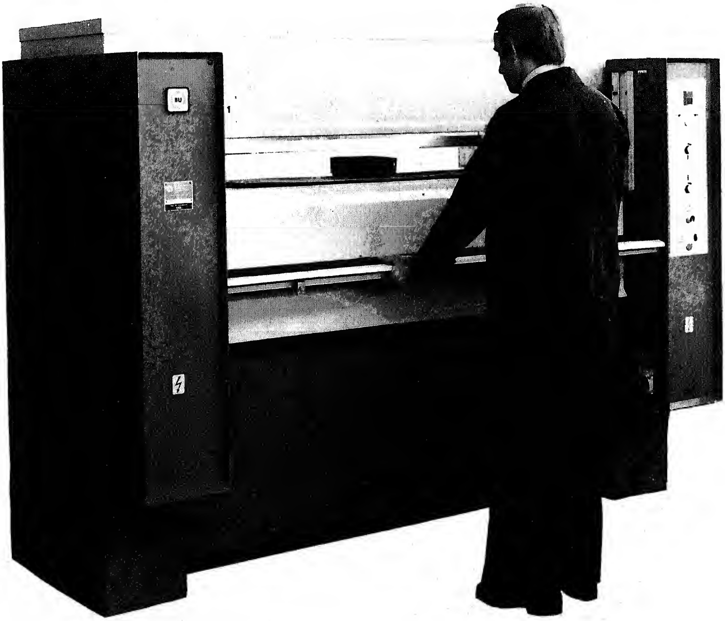


Fig 9 New hydraulic beam press being used to cut soles (para 64(a))

operators, will be reduced by implementing the training procedures outlined in the code of practice. The effectiveness of the code will be kept under review by monitoring the types and causes of accidents at the machines. The number of revolution presses in use is declining both as a result of a growing awareness of the risks associated with the machine and changes in the industry. The eventual phasing out of use of the machines will eliminate one of the most hazardous operations in footwear manufacture. In essence the measures that will be appropriate at these machines in the short term will amount to a safe system of work of the kind required under Section 2 of the HSW Act.

Revolution presses are being replaced by presses of different construction. Typically such a press incorporates a moving top beam but uses hydraulic systems in place of a mechanical clutch for power transmission. Such machines are more easily adapted to include safety features. The NIG has been very closely involved in the developments associated with these 'replacement' machines. A particular feature of all presses currently being developed is the use of photo-electric (PE) devices to provide for safety of the operator. On one machine this has been supplemented by a traditional operator's two-hand control arrangement but all machines have the advantage that other persons as well as the operator are protected.

The increased reliability of PE safety devices has enabled them to be used for high-risk applications. A PE device is particularly suited to use on presses where good visibility and access is essential. A feature which is likely to become very popular is the use of the device to initiate the cutting stroke thus reducing operation time and increasing productivity in an industry which is highly labour intensive.

(b) *Travelling head presses* There have been few changes in the design of safeguarding of these presses which are used primarily for cutting components from large sheets or rolls of material. It is likely that the new beam presses will be able to perform identical tasks and may replace this type of press for many operations. Safety depends upon two-hand control with supplementary safeguarding of secondary traps between fixed and moving parts and at feed rollers. Two-hand controls originally only fitted to control the cutting stroke have been applied to traversing controls on both new and existing machines. A number of accidents have occurred as the result of trapping of the operator's free hand between the traversing head and the knife while moving the head with one hand. Two-hand traversing eliminates this risk. All manufacturers are now also supplying two-hand controls to the standard set out in British Standard BS5304:1975 whereas prior to 1978 many machines could be operated otherwise than by simultaneous operation of the controls and many control systems did not have to be restored to an original condition before a subsequent cycle could be started. Setting operations both at these and many footwear machines are often carried out under power. This presents a risk of trapping to the setter who is often also the operator. Two-hand controls, deadman's controls and crawl controls have been provided by a few suppliers but

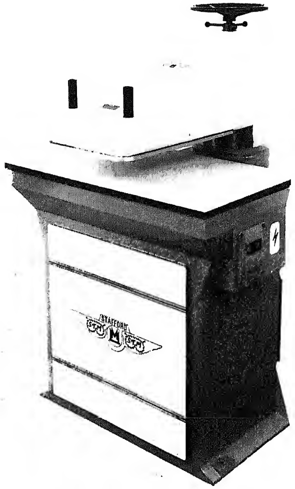


Fig 10 Typical swing arm press (para 64(c))

Footwear machinery accidents in Great Britain 1980 *Provisional figures*

Machine type	*Trimming and paring*	*Skiving roughing and brushing etc*	*Revolution presses*	*Clicking and travelling head presses*	*Plastic injection moulding machines*	*Attaching lasting and eyeletting etc*	*Sewing and stitching*	*Back part moulding*	*Other machines*	*Total*
Reported accidents	13	16	7	10	6	18	25	3	22	120

there is still a tendency to overlook the risks associated with setting when designing footwear machines.

(c) *Swing arm presses* often called 'clicking' presses are the most common press in the industry, and are used extensively for component cutting using shallow knives. Two-hand controls are provided to secure the safety of the operator. As with the travelling head presses the NIG took action in 1978 to ensure that all new presses were supplied with two-hand controls to BS5304: 1975.

In cases where the standard of design is lower than that set out in BS5304 the failure of two-hand control devices allowing the press to be operated by one button only is not uncommon.

There have been few developments of these machines affecting safety but the most significant have been the introduction of powered setting on certain models to replace the 'hand-wheel' setting, and the introduction by one manufacturer of a 'touch' control initiation. As the system relies entirely upon an electronic control system with no mechanical initiation the circuits are required to be to the highest standard. The machine has now been in service for about two years and there are no indications of any significant safety deficiencies as the result of using this system. The principle, however, has not been developed by other manufacturers.

Attaching and laminating machines

65 A large variety of machines with a pressing action are used in the industry for attaching components such as heels and soles and for sub-assembly operations such as attachment of linings and assembly of sole units. These machines, in addition to the trapping risk, may have heated platens which have in certain cases resulted in very serious injuries. There have been few fundamental developments in the machines used although the increased use of staple attachment machines for top pieces has reduced the risks associated with the previous machines which pressed the top piece components into the heel.

66 The problem of safeguarding machines in an industry where fashions change regularly is highlighted in this range of machines. Machines are often adapted to the fashion changes and a system which provides adequate safeguarding for certain operations may be inadequate when fashion changes require different component shapes to be handled. This requirement for flexibility has prompted many footwear manufacturers to produce 'one-off' machines to their own design. Small pneumatic presses often foot-operated or with a single button control, are in use and many of them were built to deal with the wedge heels and very thick units popular some time ago. Little serious consideration has been given to safeguarding such machines and even where safeguarding is provided it is often in the form of ineffective two-button control devices, with no fixed guards to prevent access from the sides and rear of the pressing head.

(a) *Attaching machines* this range of machines, covering such operations as heel and sole attaching, illustrates the tendency of the industry to develop 'safety devices' rather than the more effective fundamental methods of guarding. Such devices include two-pressure systems, two-stage initiations, two-hand control, trip devices and 'ergonomic' safety.

There is no doubt that on certain machines the need to hold the component until correctly located renders conventional guarding impracticable. Mechanical holding devices are often not conveniently feasible because of greatly differing styles and sizes and shapes of footwear. However, many simple pressing operations do not require the component to be held and simple interlocked guarding would be effective. The NIG has been concerned about the effectiveness of many two-pressure systems, i.e. where the component is located under a low pressure initially and the operator can then remove his hand from the danger area and a high pressure clamping force is initiated. Some systems fail to take account of likely human behaviour, both deliberate and inadvertent. Such a

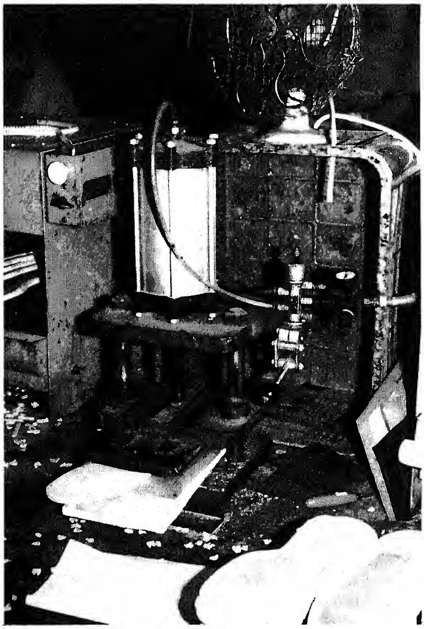


Fig 11 Inadequately safeguarded pneumatic press used for attaching rands to sole units (para 66)

system was applied to some heel nailing machines and consisted of one pedal which could be moved through two operating positions. The first part of the travel of the pedal caused the dangerous parts to close under low pressure and then further movement applied a higher pressure force to those parts. However, it was quite possible for an operator to depress the pedal to the high pressure position prematurely and this was the cause of a number of accidents. Consequently these machines are no longer operated by foot pedal alone but require the operator to work a separate hand control. Whilst two-pressure systems can be used effectively the method of initiation must be carefully considered and where it is possible to defeat the system, additional safeguards need to be applied.

(b) *Laminating presses* neither the design nor the safeguarding of laminating presses has changed significantly over a number of years but their use has become more common because of the increased use of thermo-activated linings and stiffeners. Although it is uncommon, one kind of accident which can occur is when an operator is trapped between the heated platens, having initiated the closing cycle, and the guard springs open before the platens are fully closed. Safeguarding has usually been secured by an interlocked guard which operated the press head. Recent developments have improved the integrity of existing systems by ensuring that the guard remains locked down during the cycle.

Plastic moulding machines

67 Modern footwear construction makes increased use of plastics and other synthetic sole components. Sole units are often produced in one piece on injection sole moulding machines and in some cases soles are directly moulded onto the lasted shoe either by vulcanising or injection moulding techniques. The increased use of such machines had led to new and more serious hazards.

68 Fortunately, there is often no need for visibility of and access to the dangerous parts because the machines operate automatically. The operator merely loads and unloads the machine. However, there is considerable variation in the standards of safeguarding. Although as yet the number of accidents is not great, in view of the potential for serious injury the NIG has been looking into the methods and standards of safeguarding.

69 In most cases conventional methods of interlocked guarding can be used on this type of machine. However, because of the history of difficulties in safeguarding footwear machines there is a tendency to rely upon operator skill and not to provide all the necessary safeguards. For example, toolsetting is often intended to be carried out with guards removed and no special precautions such as deadman's controls or crawl actions are provided as set out in BS5304:1975. There is, however, a growing awareness in the industry of the need for guidance and improved standards at these types of machines and the matter has recently been under review by the Joint Industry Safety Committee (JISC) and the NIG.

Scouring, brush and trimming machines

70 These machines present very particular problems of safeguarding. They present risk of both contact and entanglement. There have been few changes to the basic design of safeguarding of these machines and although the machines cause a number of accidents, these are frequently of a minor nature.

71 Clearly because of the need for access there is little that can be done to guard cutters and abrasive surfaces if the machines are to remain usable. Exposed lengths of rotating shafting close to the workpiece are well-known traditional hazards easily guarded by conventional means, but most frequently neglected in the industry.

72 Some of these operations lend themselves to automation, and scouring, in particular, has been carried on automatic machines. While such developments will reduce the possibility of contact, it is likely that the general problems will persist for a long time.

Embossing, marking and punching machines

73 These types of machines are used on component parts of footwear and usually on the upper. The standards of safeguarding have been variable but in general because a single flat component is being handled, conventional guarding can and has been provided.

Lasting machines

74 Machines in this category illustrate the problems in footwear machinery safeguarding. The machines have been designed to replace the old hand operations of forming an upper around a last. However, although part of the operation has been automated there is still a need for the operator to exercise considerable skill and expertise as the operation progresses. The continual variations in shoe size and style require that the operator be given considerable scope to carry out adjustments and control, this freedom of access has its dangers. Because footwear is made from natural materials and individually fabricated it is inevitable that there will be slight variations between each piece of footwear. Although there are a considerable number of trapping areas on lasting machines because of the need to avoid damage to the product, clamps, etc., are

often rubber faced which reduces the likely severity of injury. To a very great extent safety is dependent upon the skill and dexterity of the operator and the ergonomic factors in the machine design. Emergency stopping or opening devices are the only mechanical safeguards provided. Fortunately, although it is known that minor accidents occur regularly on these machines, they generally do not cause time to be lost from work.

Other machines

75 There are many other machines used for special operations such as eyeletting, riveting, skiving and sewing and each has its own particular problems. The need for improved guards is being tackled by manufacturers to whom Section 6 of the HSW Act has been a stimulus.

Maintenance

76 A particular feature of the footwear industry is its established practices in respect of routine maintenance and adjustments of machinery and equipment. Because of the craft traditions of the industry it is common for operators to carry out routine mechanical adjustments and often to correct minor faults in machine performance. The result has been that many tasks which in other industries might be regarded as requiring specialised attention are, in the footwear industry, seen as part of the operator's normal job. This presents special difficulties when considering the standards of safeguarding and only recently have machinery manufacturers begun to fully appreciate the need for the interlocking of guards which are opened regularly by the operators for adjustment, etc.

77 As machines become more complex and require more sophisticated technical servicing this problem will decrease. However, maintenance engineers will need to be better trained and better qualified to deal with the new equipment. If this foreseen need for higher skills is not met there is a risk that standards of maintenance of machines including that of safety devices will not be high enough and lead to injuries through malfunctions. This danger is likely to be heightened by the trend in certain sections fo the industry away from the use of rented equipment which is regularly serviced by its owners.

Health

78 Changes in production techniques and materials and the increased use of adhesives for sole attachment have resulted in an additional range of health hazards where in the past attention has been focused on leather dust. One of the disadvantages suffered by many footwear factories is the age, design and condition of the premises. This is highlighted in the East Midlands Area where many of the older established companies occupy late 19th century buildings. This presents difficulties in the areas of health and welfare. It has been a noticeable consequence of the recession suffered in the industry that the reductions in the workforce have led to improved working conditions in many of the formerly very crowded factories.

(a) *Dust* Nasal cancer in footwear workers became a prescribed industrial disease in 1979. This followed research which had suggested a causal link between the disease and the exposure of footwear workers to workplace dust. Further work is currently being undertaken by the NIG to look at current dust exposure levels bearing in mind the change in materials, i.e. man-made materials have partially replaced leather.

The extent of the problem is difficult to determine in view of the development period for the disease (typically at least 20 years) which would mean the changes in materials may not yet be affecting current figures. Latest figures available indicate that in the 12 years 1968-79, of the 27 cases of nasal cancer in Northamptonshire, 5 had links with the footwear industry. This compares with a total of 46 cases in the preceding 15-year period (1953-67) of which 21 were linked with the footwear industry.

Clearly it is essential for dusty operations to be carried out with good dust control including local exhaust ventilation. It is usual for operations such as scouring, trimming and buffing to be provided with local exhaust ventilation. However, mere handling of natural material, such as leather, will generate some dust, a fact that soon becomes evident in workplaces where there are poor standards or irregular cleaning.

(b) *Solvents* are used extensively throughout the industry in sprays, adhesives, cleaners and primers. The problems resulting from the large scale use of these have been recognised by the industry and many companies have installed control ventilation equipment to prevent exposure of employees to levels of solvents above the TLV. A variety of solvents is used including methyl-ethyl-ketone, acetone, toluene, ethyl-acetate and 1, 1, 1-trichloroethane. Although trichloroethane is still found in some cleaners its usage is small and benzene is no longer used.

Another solvent, n-hexane, though not commonly used in the industry and then usually as a component only of special boiling-point solvents, is being studied by the Employment Medical Advisory Service. This follows reported cases of Shoemaker's polyneuritis, principally in Italy, which are thought to have been caused by exposure to n-hexane in footwear production processes. At present similar problems have not arisen in Great Britain probably due to a less common use of n-hexane, better working conditions and different climatic conditions.

A review of earlier sampling reports and a small-scale local survey in 1978 revealed that conditions varied from factory to factory. However, there were still many employees exposed to solvent levels well in excess of TLVs. Analysis of exposure is complicated by the combinations of solvents used and it is not known whether there are inter-active effects of medical significance between the constituents of solvent mixtures.

Conditions in areas where solvents and solvent-based materials are handled have continued to improve. To provide guidance for the industry the JISC is preparing a booklet which will detail types of solvents, handling precautions and control ventilation. It will identify areas of special concern like sole cementing, heel dipping and heel covering and provide practical advice and information both for employees and employers.

One item often neglected by companies when attempting to reduce the exposure of employees to solvent fume is the importance of layout. Individual solvent operations may not in isolation expose employees to levels above the TLV. However, sometimes there is an increased background level of solvent in air as the result of an adjacent operation without adequate control of fume. In many cases, the provision of controlled local exhaust ventilation is not reasonably practicable, for example on tracks, but provided there is a good standard of natural ventilation, possibly assisted by mechanical ventilation, levels of solvent in the atmosphere can be effectively controlled to below the TLV.

Many factories do not provide adequate maintenance for mechanical ventilation equipment and ducts become restricted and cabinets blocked. The entire subject of solvent fume control and working conditions in adhesive and similar areas is still a matter of concern and there is considerable room for improvement in many parts of the industry.

(c) *Isocyanates* both as toluene di-isocyanate (TDI) and methylene bisphenyl isocyanate (MDI), are found in the footwear industry. Di-isocyanates are used in certain two-part adhesives with the free isocyanate in the prepolymer component of the adhesive. Isocyanates are also now commonly found in the production of sole components and the direct sole moulding techniques onto lasted uppers.

The two-part adhesives are not widely used and have become less popular with improvements in

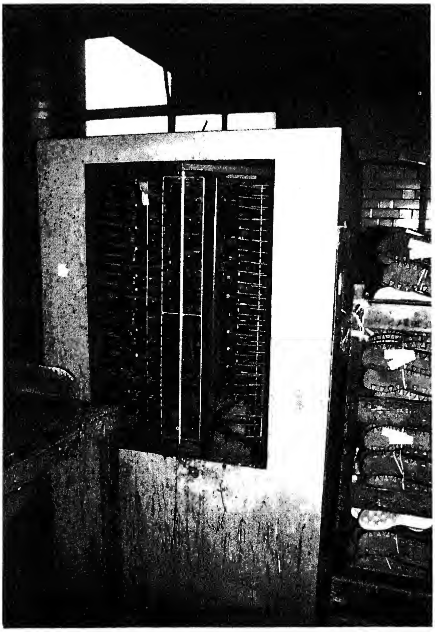


Fig 12 Exhaust ventilated sole drying cabinet (para 78(b))

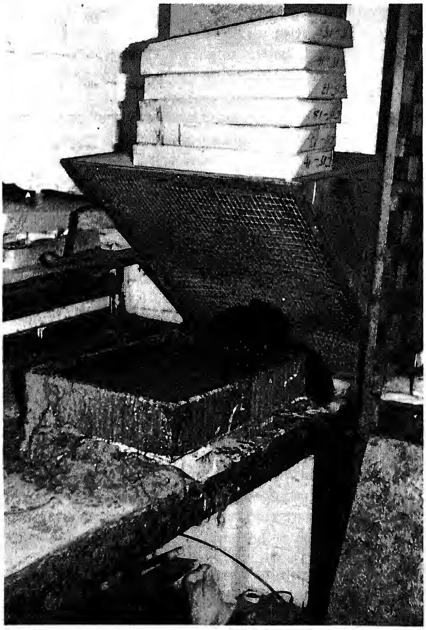


Fig 13 Local exhaust ventilation to control solvent fume at a heel dipping tank (para 78(b))

conventional contact adhesives. Sampling results do not indicate that at normal ambient temperatures the percentages of free isocyanate are likely to result in exposures to the operator in excess of the TLV. However, as these adhesives are often solvent-based the provision of local exhaust ventilation where the adhesive is used continuously would effectively control both the solvent and any small isocyanate risk.

The increasing trend towards the very hard wearing lightweight polyurethane (PU) sole has meant an increasing number of employees exposed to isocyanates used in the production of polyurethane. MDI is used in this operation usually in the form of a prepolymer. There are now a number of polyurethane 'systems' and machines available.

For component moulding the two components (prepolymer and polyol) are dispensed into open moulds from a nozzle. This mould is closed, the reaction takes place and the components are subsequently removed after a set time. The machines usually consist of a number of moulds which index as the dispenser is moved to each in turn. For direct moulding the components are injected into a closed mould formed by the lasted upper and the sole mould. The injection head is fixed and the rotary tables indexes. The operation is usually automatic or semi-automatic.

Exhaust ventilation is usually provided at the injection or dispensing point and results of atmospheric sampling have shown low levels of isocyanate in the atmosphere at ambient temperatures. In addition, the mixing area where the isocyanate is held is often segregated and provided with exhaust ventilation.

However, it has been noted with particular concern that many companies handling these potentially hazardous chemicals have very poorly defined and supervised systems of work or training in the safe handling of isocyanates. There also needs to be a greater awareness of the importance of medical surveillance for prospective employees in such areas.

(d) *Noise* High noise levels are found in traditional welted plant such as rounding machines and stitchers. Where revolution presses are used in bottom stock production employees are exposed to high noise levels typically of the order 92-98 dB(A). The problem is most acute at equipment where noise is continuous, for example, at rough rounders and in-seam trimmers. Where intermittent operations are carried out, for example, at loose nailing machines the inoperative period can reduce the operator's total noise exposure.

The sources of the noise are often the impact parts of the machine, for example, the nailing head or the paring blades. Indeed noise levels from continuously operating machines such as rounding and channelling machines may be reduced when the workpiece is introduced. Reduction of noise levels from this type of machine would require fundamental redesign of the action. Some reduction of noise from other sources, such as gear trains and drive belts could be achieved more easily by good design or acoustic enclosure. On old machines guarding could be constructed to provide both mechanical and acoustic protection. However, many factories do not have welted plant and noise levels are lower in more modern production areas. Background levels in these areas would be probably no more than 85 dB(A).

Workpiece generated noise can occur, for example, at edge trimmers and scourers and will be dependent upon the materials used and operator technique. Peaks up to 96 dB(A) have been found at some scouring operations. Machine design is unlikely to reduce workpiece-generated noise significantly. However, general background noise levels can be attenuated by reduction of impact noise for example, at attaching operations and by adequate silencing of pneumatic equipment. Generally the exposure of employees to noise has been reduced. Increased sophistication in production techniques combined with flowline or track production have produced less congested working areas. This reduces the total noise exposure. However, the traditional manufacturing areas remain congested, so here noise levels remain high. The problem is exacerbated by the associated high concentrations of employees in such areas. Careful thought about machine layout could considerably improve noise exposure levels although production considerations may be incompatible with optimum noise reduction. Even in the non-welted plant noise levels may be increased by poor plant layout and produce noise problems where none need exist. Individual ventilation extraction units at machines generate significant levels of noise, although well below 90 dB(A), but in one instance a clustered bank of eight of these machines was found to produce excessive background noise levels.

Noise problems in the footwear industry appear to be concentrated in welted plant and certain bottom stock areas outlined above. The industry has tended towards the provision of protective equipment rather than considering machine design, and the earmuff is now more frequently encountered. However, there still appears to be a lack of awareness of noise problems and more effort is needed in providing engineering solutions to the problems caused by these machines.

(e) *High frequency radiations* The exposure of employees to the high frequency radiation used in cut and weld machines and similar equipment used for plastic components has recently given cause for concern. Although the problem is substantially one associated with the plastics industry it was highlighted in the footwear industry following some tests carried out at certain footwear manufacturing equipment. Results indicated a higher than expected level of exposure. A particular feature of the problem is the close proximity of the operator's body to the HF emitter because of the use of two-hand controls rather than conventional guarding which gives additional protection against radiation.

Preliminary work was commenced on this subject in 1980 and it is hoped to look into the problem in more detail. It is understood, however, that the use of HF techniques in the footwear industry is reducing as the use of leather rather than plastic uppers increases.

Fire risks

79 The large quantities of highly flammable adhesives, solvents and finishes used throughout the footwear industry represent a considerable process fire risk. Polyurethane foam-backed materials are also used for linings of shoes.

(a) *Highly flammable liquids* The control and safe handling of highly flammable liquids continues to be one of the most serious problems encountered in the industry. The standards of compliance with the requirements of the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 are often poor particularly with respect to housekeeping. However, in the East Midlands Area it has been noted that overall standards have been steadily improving.

Dispensing adhesive and solvent safely is a problem in many areas of production in particular where large surface areas are covered. The volume used encourages the use of adhesives directly from open topped round 5-litre containers with resultant risks of spillage. One new dispenser has been produced which does not require the can to be opened but relies upon a punch to penetrate the can and allow adhesive into the dispenser. Although this is a considerable improvement on the need to open the can and attach the dispenser, there are still difficulties with poor adhesive flow and blockages.

It is still common to find the tops missing from both full and empty cans of adhesives and solvents. Many factories have provided metal storage containers for these highly flammable liquids but their use is often not properly supervised. The result is that excessive quantities of adhesive and solvent are stored in the working areas and when not in use containers cannot be stored in a safe place. Solvents are often handled in an unsafe manner. It is common for employees to use solvents to clean their hands and leave brushes and other items soaking in the open topped containers of highly flammable solvent, such as MEK or acetone. With some planning and forethought suitable containers can be designed for such soaking operations which cannot be easily knocked over and which have lids or covers which can be replaced easily.

Another problem frequently encountered is the building up of excessive residues. Generally spray booths are regularly cleaned of residues but this often does not extend to equipment such as cementing benches and machines. It is not unusual to see residues inches thick at sole cementing machines and this presents a considerably increased fire risk. A regular and systematic cleaning programme is essential.

(b) *Polyurethane foam* The usage of PU foam-backed materials has declined in certain sections of the industry. However, as a fashion industry a change towards increased use of these materials could occur at any time. The industry seems to be very aware of the risks associated with this material and its storage. Where any substantial quantities are stored suitable fire resisting stores are used; this is often a requirement of the fire certificate. In many instances companies have decided to use alternative materials to avoid storage and use of PU foam.

Minimum quantities are usually found within workrooms and once cut up and combined with other materials the relatively small volumes used represent in general a small process fire risk. It is important, however, that the awareness is maintained and standards do not drop.

International work

80 The NIG has been involved in two international projects where assistance was sought by the International Labour Organisation (ILO) and the International Agency for Research on Cancer (IARC) respectively. (see para 132)

81 On the occasion of the ILO second tripartite technical meeting for the leather and footwear industries a paper was prepared by the NIG outlining the developments in the field of health and safety in the light of technical developments in the period 1970-79. This paper was consolidated in the report prepared for the conference, which was attended by a member of HM Factory Inspectorate from the NIG.

Leather and leather goods

82 The British leather industry is small, consisting of about 200 factories which process both domestic and foreign hides and skins. While tanneries have always existed in rural areas throughout Britain in order to process local raw materials, since the importation of foreign hides and skins began on a significant scale in the nineteenth century there have been concentrations of the industry in a number of centres such as West Yorkshire and Northampton.

83 Although there are a number of large companies in the industry, most undertakings are of the small to medium size. The leather and leather goods industries employ a total of approximately 27000.

84 Standards of health and safety measures have been extremely variable. Most of the companies are members of the Leather Producers Association (LPA). The NIG has tried to influence employers and unions to achieve more uniformly satisfactory conditions in the industry.

85 The industry is labour intensive and skins and hides are processed individually on machines which have changed little over the past 50 years.

86 The processing of wet heavy hides, which involves the use of corrosive chemicals and large quantities of water, is by its nature, unlikely to lead to the easy achievement of a clean and pleasant working environment. Unfortunately it is only a small number of the better companies which have achieved reasonably congenial conditions.

Tannery drums

87 An essential feature of the leather industry is the processing of skins and hides in rotary drums. Such drums are used both for a number of wet chemical reactions such as tanning and dyeing and also for dry process work such as conditioning and softening. Traditionally, tannery drums have been cylindrical with horizontal axes and incorporating pegs or shelves which facilitate the mixing of materials within the drums.

88 Although there have been developments over the past 15 years towards the use of different types of drums, the wooden cylindrical drum is still the most commonly used type. The hazards presented by a traditional tannery drum include: entanglement or being struck by projections, dangerous movement of the drum when a person is leaning in, and the risk of injury from the prime movers and transmission machinery driving the drum. Although such hazards are eminently foreseeable and capable of simple solutions the actual standard of guarding at the time of the NIG was set up varied widely across the industry.

89 The NIG suggested to the Leather Producers Association (LPA) that this matter required an early national initiative and the LPA responded by setting up a Working Party with members representing the LPA, National Union of Footwear, Leather and Allied Trades (NUFLAT) and HSE. The outcome was the publication by the LPA of a code of practice, 'Safeguarding of Tannery Drums', in March 1980. The code is restricted in its application to drums revolving in a horizontal axes between 3.0m and 0.75m in diameter which are loaded and unloaded from a single floor level. It is the intention of the industry to publish a supplement to this code which will cover the remaining types of drums including the latest developments in tannery processing, i.e. the use of 'concrete mixer-type' and 'laundry-type' vessels.

90 Although improvements in the standard of guarding are mechanically straightforward they can be costly because tanneries may have up to 20 such drums. Because of this the working party included in the introduction to the code an implementation programme which required immediate application only to all new and resited drums and required the measures on existing installations to be completed as soon as practicable but generally within five years. The response from industry in a period of recession has been mixed. Some prudent employers have incorporated the requirements of the code within their programme for renewing tannery equipment while others believe that they may only be able to afford such improvements in three or four years time. HM Inspectors have encouraged employers to draw up programmes of remedial action for each tannery which not only reflects the cost of the improvements but also the degree of risk involved.

91 Tannery drums are usually subject to a wet and corrosive environment and therefore guarding and associated switchgear are exposed to searching conditions. The NIG will be examining the performance of various materials from which fixed guards are provided and hope also to obtain useful information as to the suitability of various limit switches and their positioning.

Multi-roller leather machines

92 Multi-roller leather machines have two or more feed rollers which are closed together under power to process leather. This basic mechanical arrangement has been varied in a number of ways to produce machines capable of performing a wide range of functions. The standard of guarding of this closing action has been generally low and there have been a significant number of accidents over the years.

93 The guarding of the closing action presents serious practical difficulties. A large number of older machines were not guarded at all and were driven through half cycle mechanical clutches. In recent years, photo-

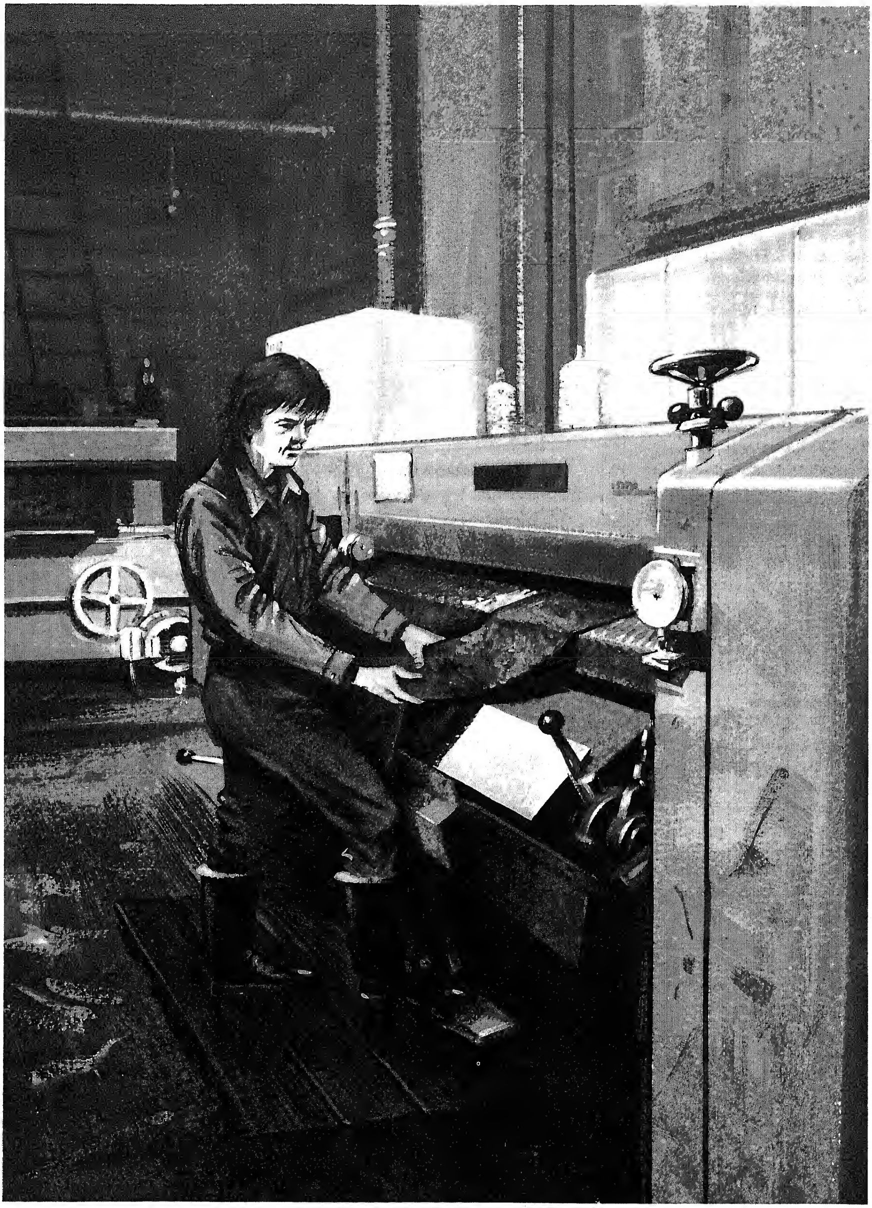


Fig 14 A multi-roller machine of the type in common use. Trapping by the feed rollers is prevented by a photo-electric device (para 92)

electric guards have been provided for some new machines fitted with hydraulically powered closing actions. The NIG asked the LPA to set up a working party to produce a code of practice for the safeguarding of multi-roller machines.

94 The working party consisting of members of the HSE, LPA, NUFLAT, and machinery suppliers, drafted a code which was published in 1981 and which gave good illustrations of methods of complying with legal standards.

95 Most employers in the leather industry have a number of multi-roller machines. Because of the expenses involved and the limits of the engineering resources available to carry out adaptations the working party has suggested a time scale over which improvements should be made. Priority is to be given to the replacement of half cycle mechanical clutches and adaptations should proceed at the rate of at least one machine each six months.

96 In some cases compliance with the code may create some practical difficulties because of the nature of the material being processed. Employers are being advised to consult HSE and machinery suppliers where difficulties arise.

Council of Europe – Resolution AP(69)7

97 In 1969 the Council of Ministers adopted Resolution AP(69)7 which was concerned with the safety of workers in the use of certain tannery machinery and equipment. The United Kingdom was a party to the partial agreement in the social and public health field and so was affected by this resolution.

98 In 1974 the LPA published a document which reproduced the resolution and also gave advice to the industry about its legal standing and how the standards of the resolution should be achieved.

99 Progress towards meeting these standards has been slow, and in fact the main principles of the two tripartite codes of practice so far produced (Tannery Drums and Multi-roller Machines) were embodied in the resolution of 1969.

Tanning processes

100 Many machines used in tanning processes attract the provision of the tanning drum code of practice recently produced by the tripartite working group and

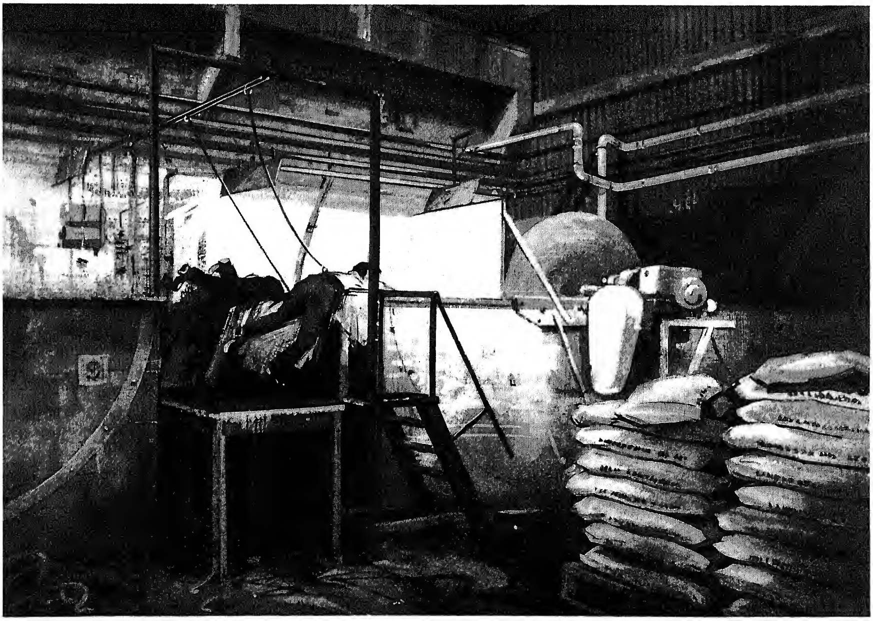


Fig 15 Paddling heavy skins at lime paddlers. A harness is used to safeguard the operator (para 101)

consequently it would be reasonable to expect an increase in safety performance in this field. However there is an additional influence towards increased safety because there has been in recent years a movement away from traditional drums towards 'laundry' and 'cement mixer' type drums. These are intrinsically safer and lend themselves more easily to standard methods of interlocked fencing.

101 Parts of factories where tanning and pretanning is carried on are often wet, slippery and exposed to corrosive agents; but despite the need to maintain good standards of housekeeping standards are too often less satisfactory than they might be. Naturally where such conditions are likely to occur the setting up and maintenance of safe systems of work are of prime importance, and should expressly deal with subjects such as the handling of heavy and wet materials and safety access to lime pits and other potentially dangerous plant.

Effluent plants

102 More stringent controls on discharges to sewers and water courses have caused the industry to invest a large amount of capital in the development of tannery effluent plants. This has introduced another area of concern into health and safety matters in the leather industry. Whilst new equipment is generally installed to satisfactory standards with respect to guarding there is a need for the establishment of safe systems of work for employees doing routine and maintenance operations on these plants.

Maintenance work

103 As is the case with most small to medium-sized firms, machinery maintenance is often carried out by one or two engineers who are assumed to have knowledge of a wide range of machinery. Characteristically, the supply of information about maintenance procedures to the engineering staff of their customers by machinery manufacturers and suppliers is not generous. The number of serious accidents which occur during machinery maintenance and setting indicates that an initiative is required in this area.

Machinery suppliers

104 In the past many machines have been used in the industry with little in the way of mechanical safeguards and where safety has depended upon the skill and dexterity of operators. Often such machines presented almost insoluble problems of safeguarding and had the suppliers provided effective guards which enabled the user to comply with legal requirements use of the machine would have been rendered impossible.

105 This long-established custom has unfortunately engendered a belief that operator skill is a legally acceptable alternative to secure fencing. Some machinery suppliers still proceed on the assumption that little attention needs to be given to the provision of safeguards on newer machinery even where the application of now well-established safeguarding techniques is entirely feasible.

106 HMFI does not accept this laissez-faire approach nor, equally, does it believe in the pursuit of theoretical and unrealistic standards. Serious consideration and effort now needs to be given to machine guarding by the supplier facing up to his duties under Section 6 of the HSW Act. Where this has happened, as in the case of some suppliers of multi-roller machines, well-engineered, cost-effective and productive solutions have been found.

Leather finishing

Spray finishes

107 The application of finishing materials by spray is common, but there has been a slight move away from the use of highly flammable materials towards the use of less flammable solvent systems and water-based solutions. Such operations are often carried out in unsuitable parts of premises, where general ventilation is not good and the accumulations of large quantities of finished material cause obstructions.

Isocyanates

108 As in the footwear industry, the use of isocyanates in two-part systems has declined and is now uncommon. However, where such materials are still used, the need for effective local exhaust ventilation is as important as ever.

Glazing and staking

109 Traditional machines such as glazing machines and Slocomb staking machines are still in common use. Such machines indicate the craft nature of much of the work in which the operator holds leather between fixed and moving parts of machinery. The safeguarding of these machines presents very considerable practical difficulties and safety depends very much upon the operator's skill. These machines remain popular despite the availability of more modern machinery, because they permit a higher degree of personal control over the process by the operator. However, to some extent, multi-roller machines are replacing the older machines and provided the new machines are safeguarded in accordance with the code of practice there should be an increased level of safety.

Pressing

110 The use of modern presses with interlocked guards has reduced the usage of presses of the 'Gloria' type in which leather is treated between a travelling pressure roller and a heated plate. However, some 'Gloria' machines remain in use and in these cases it is essential that secure fencing is provided both for the trap between the plate and roller, and for the rotating driving screw.

Health and hygiene

Dyestuffs

111 Dyestuffs are almost invariably used in the processing of skins and hides. They are normally supplied as powders, and manipulated within tanneries both in powder and in solution form. Dyes are used in a number of industries but because they are so extensively used in the textile industry the wool textile NIG has co-ordinated HMFI's recent activities in this field. In 1980 a tripartite committee of employers, trade unions and the HSE produced a code of practice on the safe handling of dyestuffs in colour stores. The objective of the code is the reduction of exposure of workpeople to dyestuffs by the improvement of handling practices and in welfare facilities. The code gives advice about the construction of colour stores, storage of dyestuffs, housekeeping, local exhaust ventilation, segregation of eating, drinking and smoking, washing and bathing facilities, personal protective clothing, respiratory protection, first aid, information for employees and training and supervision.

112 The use of benzidine-based dyestuffs has received special attention. The Carcinogenic Substances Regulations 1967 prohibit the use of benzidine in factories. The Carcinogenic Substances (Prohibition of Importation) Order 1967 prohibits the import into the UK of benzidine. However, some dyestuffs known as benzidine azo dyes are manufactured from the aromatic amine benzidine and may be imported and used if they contain less than 1% of free benzidine present as a by-product of a chemical reaction.

113 About 300 tonnes a year of these benzidine azo dyes are imported, of which about half is used in the leather industry.

114 The typical free benzidine content of this imported material is between 5 and 50 parts per million. It is used commonly for the production of black and brown leather and is esteemed for both its effectiveness and relative cheapness.

115 The HSE is preparing a guidance note concerning methods for the control of exposure to dyes.

116 The possibility that exposure to these dyes might cause cancers has been raised. The Employment Medical Advisory Service has carried out an investigation in this field by testing the urine of a number of dyeworkers for the presence of benzidine and certain of its metabolites. The results were negative. The HSE has studied the available evidence concerning the effects of benzidine-based dyes and has concluded that the data do not justify a prohibition of their use.

117 The HSE will keep the problems of benzidine azo dyes under review in conjunction with users and suppliers.

Other chemicals

118 A wide variety of organic and inorganic chemicals are used in tannery processes. Inevitably, because of the very effect which these chemicals are intended to produce on skins they have a significant potential for injury. Many of the chemicals, and particularly the chromium tanning agents, are harsh and have a dermatitic effect. There has been little progress towards the adoption of mechanical or piped transfer of chemicals and indeed because of the batch type nature of the tanning process, there is probably small scope for the use of such methods.

Use of chromium compounds

119 Hexavalent chromium is known to be carcinogenic and its use has been discontinued in the British leather industry, although it is still used in some foreign industries and in the furskin industry in Britain (see para 138).

120 Consequently, the Tanning (Two Bath Process) Welfare Order 1918 has little contemporary practical application.

121 One of the requirements of the Tanning Welfare Order 1930 is that where chromates or salts of chromium are used, an inspection of the fingers of people coming into contact with such materials should be made twice a week. Trivalent chromium is a very common tanning agent, but visits to leather factories reveal that such regular inspoections of fingers are rarely carried out as they should be.

Anthrax

122 There is still a risk of cutaneous anthrax infection where raw hides are handled. Suitable precautions are set out in the Health and Safety Executive Guidance Note EH/23 (Anthrax Health Hazards) and these include the provision of active immunisation and the establishment of a procedure to ensure early recognition and treatment of the infection. The recognition of anthrax is facilitated if the Anthrax Cautionary Notice (Form 410) is displayed and the Anthrax Card MS(B)3 given to each person at risk.

123 Before the introduction of antibiotics the disease was often fatal, but now, providing that prompt medical aid is given, complete recovery can be expected in nearly all cases of cutaneous anthrax infection. Pulmonary anthrax is extremely rare, but is usually fatal when it does occur.

124 Cutaneous anthrax still occurs occasionally, usually in persons handling raw hides who are not aware of the risk. Some cases have occurred in educational institutions where raw hides are handled in the course of student work in the leather trade. Others have occurred in areas previously used for storage of hides; anthrax spores can survive for many years in adverse conditions and retain their property of causing infection when introduced into the skin or inhaled. Anthrax is notifiable as a dangerous occurrence under the Notification of Accidents and Dangerous Occurrences Regulations 1980.

Leather dust

125 In 1970 a paper entitled 'Nasal Cancer in the Northamptonshire Boot and Shoe Industry was published in the *British Medical Journal* which suggested that the number of cases of nasal cancer found in employees who had worked in press rooms and finishing departments of shoe factories was above the average for the population as a whole. Because one of the dusts to which these people were exposed was leather dust it was decided to investigate the levels of exposure in the leather manufacturing industry where far greater concentrations of leather dust might be expected to be found.

126 During 1978 and 79, some 40 factories producing leather were visited and over 220 atmospheric samples were taken.

127 The air sampled was typical of that which an operator would breathe whilst working at various processes. Nearly all the results indicated exposure to less than half the current hygiene standard for nuisance dust (10 mg/m^3) but in many cases advice was given on improvements which could be achieved in exhaust ventilation.

128 The highest levels of exposures were found at buffing and brushing operations where dust was produced not only at the machine but from the hide as it was handled during movement between one machine and another. Combined buffing and airblast brushing machines were usually provided with efficient exhaust ventilation and the amount of handling was less. At these machines exposure was substantially lower.

129 Most of the machines were provided with exhaust ventilation, either by connection to a central extraction system or by use of individual fans and collector units. The efficiency of such systems varied considerably but exposure was not directly related to the extraction rate due to complicating factors, such as the design and position of the ventilation ducts, the moisture content of the leather and the methods of handling.

130 Dry drumming and staking operations also produce comparatively high dust levels in some factories and extraction is not always provided at these machines. Where dry drumming operations have been enclosed, effective dust control has been achieved.

131 Nasal cancer in leather workers became a prescribed industrial disease in 1979. This followed studies by Acheson between 1953 and 1974 which pointed in particular to problems of leather dust in the shoe industry (see Appendix 2). The results which emerged were of course related to conditions in previous decades and since those times there have been significant changes both in conditions and in the extent to which buffing of leather soles, now substantially replaced by synthetic materials, is carried out.

132 The International Agency for Research on Cancer (IARC) is an institution promoted within the World Health Organisation to stimulate research on cancer. Since 1971 it has produced a series of monographs each with the objective of evaluating the carcinogenic risk of a chemical or group of chemicals to humans.

133 In 1980 the NIG was asked by IARC to take part in the preparation of a monograph on the evaluation of the carcinogenic risk to humans in the wood, leather and associated industries.

134 In 1980 an IARC working group met to evaluate for the first time the carcinogenic risk of exposure in certain industries including the manufacture of leather, boots and shoes and leather goods.

135 One of HM Factory Inspectors was a member of the working group which met in Lyon in June 1980 and was able to provide information about the manufacturing processes and occupational hygiene data from the national survey of dust in leather-producing factories and from a local survey of exposure to solvents in the footwear industry.

136 In 1981 IARC published the monograph which describes the leather processes and details the chemicals used in the industry before surveying the international literature available on cancer. The summary of the data concludes that very few epidemiological studies deal specifically with workers in the leather industry and that the existing studies only generate hypothetical associations between employment in the leather industry and cancer of the lung, larynx, pharynx and buccal cavity. The studies do not specifically refer to the leather industry.

Furskin industry

137 There are approximately 40 firms in the furskin manufacturing industry in the UK employing around 1000 persons. The industry is centred on the London area, processing in particular minks and rabbit skins. It is a traditional craft industry and as with the leather industry there are hazards associated with the chemicals used in the tanning process and with the machinery at which skins are manipulated by hand.

138 The HSE has reviewed health and safety conditions in the industry and intends to study the use of chemicals, particularly hexavalent chromium, and the risks associated with the use of sawdust in the processes. Poor housekeeping results in accumulations of dust, mainly cornstarch, animal fur and sawdust, all of which are potentially explosive when dispersed in air. Considering the dirty and dusty nature of certain aspects of this industry it is essential that good washing and welfare facilities be provided, and there is considerable room for improvement here. This section of the industry does not appear to be feeling the effects of recession as much as most others; the need is generally not for major capital expenditure in health and safety, but rather good management.

Acknowledgement

The Plastics Footwear & Leather NIG would like to thank the following firms for illustrations.

Bipel Ltd
Blackfriars Granulators Ltd
British United Shoe Machinery Ltd
Mercier Freres Ltd
Stafford Tool & Machine Co Ltd

Appendix 1

Accidents in the plastics processing industries 1981

	Machinery	*Industrial vehicles*	*Trailers*	*Hand tools*	*Road transport*	*Other plant*	*Working surfaces*	*Scaffolds etc*	*Excavations*	*Fire/ Explosion*	*Gases, vapours*	*Other*	**Total**
Fall	8 (1)	10 (2)	–	–	12 (1)	24 (1)	139 (12)*	1 (–)	2 (1)	–	–	18 (1)	214 (19)
Trip	7 (–)	10 (2)	–	2 (–)	6 (–)	73 (4)	255 (8)	2 (–)	3 (–)			99 (5)	457 (19)
Struck	185 (15)	73 (3)	2 (–)	276 (2)	3 (–)	445 (6)	45 (1)	2 (–)	1 (–)	–	–	295 (4)	1327 (30)
Trapped	223 (14)	25 (1)	1 (–)	15 (–)	6 (1)	96 (2)	10 (–)	–	1 (–)	–	–	32 (–)	409 (18)
Over exertion	27 (–)	8 (–)	1 (–)	29 (–)	9 (–)	383 (2)	15 (–)	–	1 (–)	–	–	240 (1)	713 (3)
Electricity	9 (1)	–	–	2 (–)	–	15 (1)	–	–	–	1 (1)	–	71 (3)	98 (6)
Exposure/ contact	4 (1)	– –	– –	2 (1)	– –	4 (–)	– –	– –	– –		– –	–	10 (2)
Inhalation etc	1 (–)	–	–	–	–	2 (–)	–	–	–	2 (–)	2 (–)	17 (2)	24 (2)
Asphyxiation	1 (–)	–	–	–	–	–	–	(–)	(–)		–	–	1 (–)
Vehicle collision	1 (–)	6 (1)*	–	–	3 (–)	–	–	–	–	–	–	–	10 (1)
Other	11 (–)	4 (–)	–	7 (–)	2 (–)	10 (–)	–	–	–	1 (–)	1 (–)	122 (1)	158 (1)
Total	477 (32)	136 (9)*	4 (–)	333 (3)	41 (2)	1052 (16)	464* (21)	5 (–)	8 (1)	4 (1(	3 (–)	894 (17)	3421* (102)

Figures for major injuries are given in parenthesis

* includes 1 fatal injury

Accidents in the footwear industry 1981

	Machinery	*Industrial vehicles*	*Trailers*	*Hand tools*	*Road transport*	*Other plant*	*Working surfaces*	*Scaffolds etc*	*Excavations*	*Fire/ Explosion*	*Gases, vapours*	*Other*	Total
Fall	–	–	–	–	2 (–)	4 (–)	19 (5)	1 (–)	–	–	–	1 (–)	27 (5)
Trip	–	–	–	–	1 (–)	11 (–)	40 (–)	–	–	–	–	16 (3)	68 (3)
Struck	57 (2)	9 (–)	–	38 (–)	1 (–)	62 (1)	3 (–)	–	–	–	–	35 (–)	205 (3)
Trapped	6 (3)	4 (–)	–	–	1 (–)	19 (1)	1 (–)	–	–	–	–	3 (–)	9 (4)
Over exertion	6 (–)	2 (–)	–	5 (–)	1 (–)	55 (–)	3 (–)	1 (–)	–	–	–	41 (–)	114 (–)
Electricity	2 (–)	–	–	1 (–)		1 (–)			–	–	–	10 (–)	14 (–)
Exposure/ contact	–	– –	– –	–	– –	1 (1)	(–) –	(–) –	(–) –	(–) –	(–) –	–	1 (1)
Inhalation etc	–	–	–	–	–	–	–	–	–	–	2 (–)	3 (1)	5 (1)
Asphyxiation	–	–	–	–	–	–	–	–	–	–	–	–	–
Vehicle collision	–	* 1 (1)	–	–	–	–	–	–	–	–	–	–	1 (1)
Other	6 (–)	2 (–)	–	–	–	2 (–)	–	–	–	–	–	15 (–)	25 (–)
Total	140 (5)	* 18 *(1)*	–	44 (–)	6 (–)	155 (3)	66 (5)	2 (–)	–	–	2 (–)	124 (4)	557 (18)

Figures for major injuries are given in parenthesis

* includes 1 fatal injury

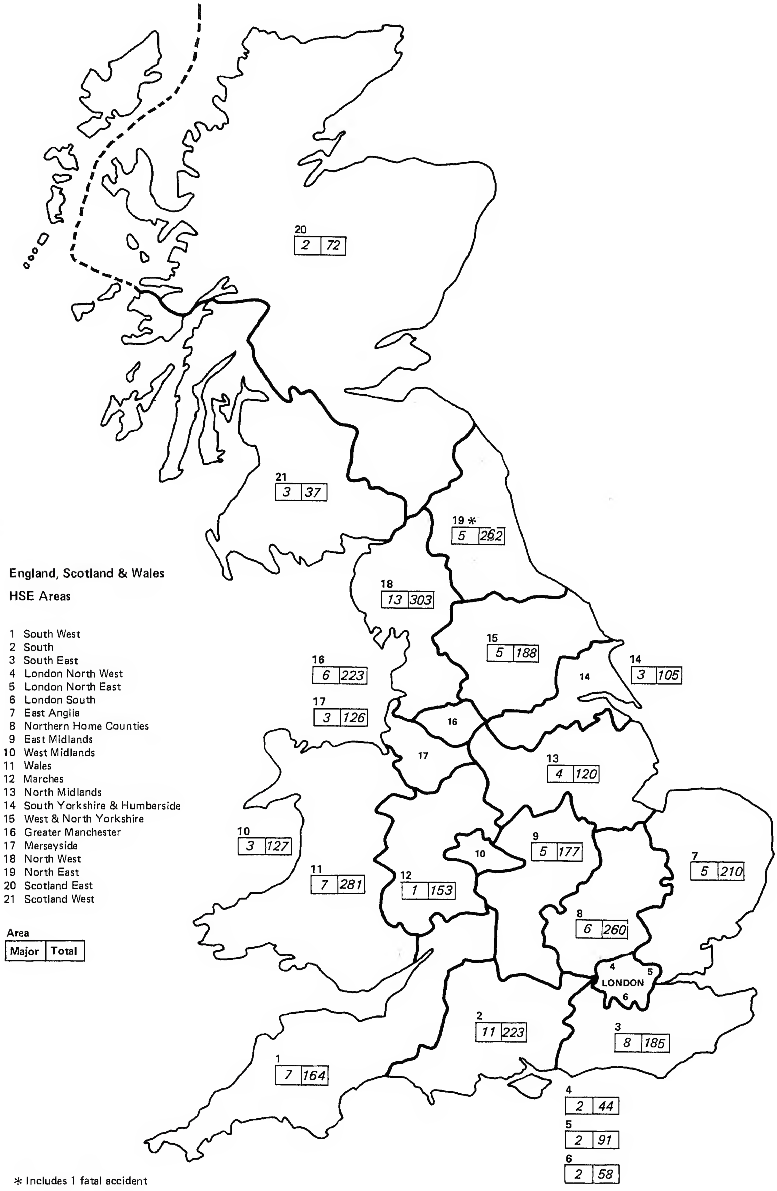
Accidents in the leather, leather goods and furskin industries 1981

	Machinery	*Industrial vehicles*	*Trailers*	*Hand tools*	*Road transport*	*Other plant*	*Working surfaces*	*Scaffolds etc*	*Excavations*	*Fire/ Explosion*	*Gases, vapours*	*Other*	**Total**
Fall	1 (–)	– –	– –	– –	4 (–)	2 (–)	26 (–)	– –	1 (–)	– –	– –	2 (1)	36 (1)
Trip	– –	1 (–)	– –	– –	1 (–)	8 (1)	33 (–)	–	3 (–)	– –	– –	10 (–)	56 (1)
Struck	31 (–)	9 (–)	1 (–)	49 (2)	4 (–)	68 (2)	6 (–)	–	–	–	–	37 (–)	205 (4)
Trapped	52 (5)	9 (–)	–	2 (–)	1 (–)	13 (–)	3 (–)	–	–	–	–	5 (–)	85 (5)
Over exertion	4 (–)	8 (–)		9 (–)	1 (–)	49 (–)	4 (–)		1 (–)			49 (–)	116 (–)
Electricity	2 (–)	–	–	–	–	1 (–)	–	–	–		2 (–)(–)	5 (–)	10 (–)
Exposure/ contact	– –	1 (–)	–	–	–	–	–	–	–	–	–	–	1 (–)
Inhalation etc	–	–	–	–	–	–	–	–	–	–	4 (3)	11 (–)	15 (3)
Asphyxiation	–	–	–	–	–	–	–	–	–	–	–	–	–
Vehicle collision	–	1 (–)	–	–	1 (1)	–	–	–	–	–	–	–	2 (1)
Other	–	1 (–)	–	1 (–)	–	2 (–)	–	–	–	–	–	28 (1)	32 (1)
Total	90 (5)	30 (–)	1 (–)	61 (2)	12 (1)	143 (3)	72 (–)	–	5 (–)	–	6 (3)	138 (2)	558 (16)

Figures for major injuries are given in parenthesis

Appendix 2

Geographical distribution of accidents in the plastics processing industry



England, Scotland & Wales

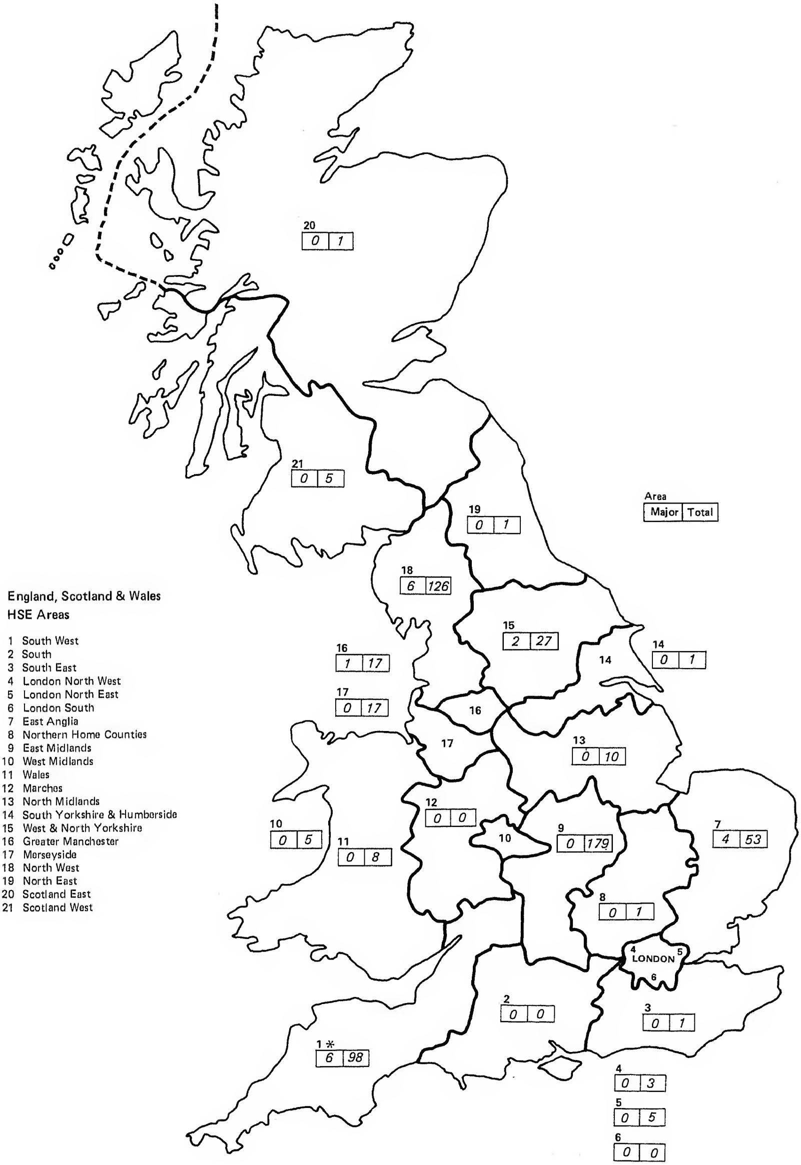
HSE Areas

1 South West
2 South
3 South East
4 London North West
5 London North East
6 London South
7 East Anglia
8 Northern Home Counties
9 East Midlands
10 West Midlands
11 Wales
12 Marches
13 North Midlands
14 South Yorkshire & Humberside
15 West & North Yorkshire
16 Greater Manchester
17 Merseyside
18 North West
19 North East
20 Scotland East
21 Scotland West

Area	
Major	Total

* Includes 1 fatal accident

Geographical distribution of accidents in the footwear industry 1981

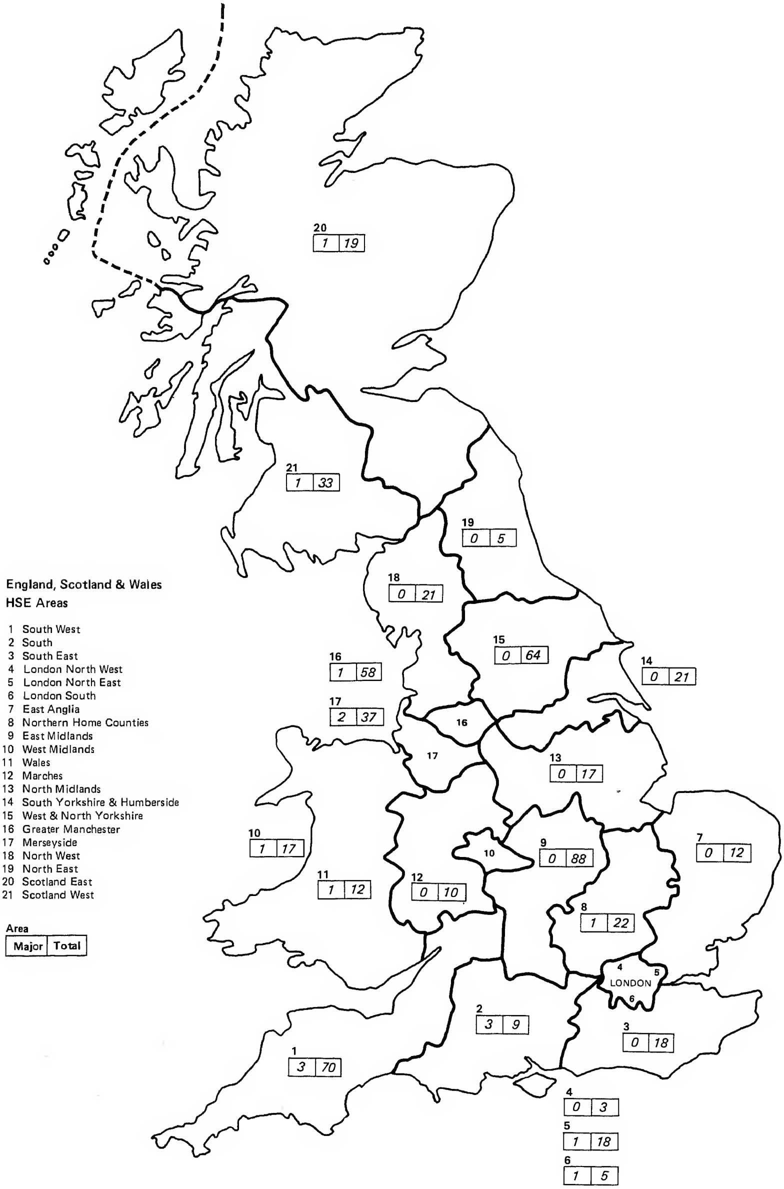


England, Scotland & Wales
HSE Areas

1	South West
2	South
3	South East
4	London North West
5	London North East
6	London South
7	East Anglia
8	Northern Home Counties
9	East Midlands
10	West Midlands
11	Wales
12	Marches
13	North Midlands
14	South Yorkshire & Humberside
15	West & North Yorkshire
16	Greater Manchester
17	Merseyside
18	North West
19	North East
20	Scotland East
21	Scotland West

* Includes 1 fatal accident

Geographical distribution of accidents in the leather and furskin industries 1981



England, Scotland & Wales
HSE Areas

1 South West
2 South
3 South East
4 London North West
5 London North East
6 London South
7 East Anglia
8 Northern Home Counties
9 East Midlands
10 West Midlands
11 Wales
12 Marches
13 North Midlands
14 South Yorkshire & Humberside
15 West & North Yorkshire
16 Greater Manchester
17 Merseyside
18 North West
19 North East
20 Scotland East
21 Scotland West

Area	
Major	Total

Appendix 3

Improvement and prohibition notices served by HMFI during 1980

Plastics industries

	Number of notices served		*Number of recipients*	
	I/N	*P/N*	*I/N*	*P/N*
Safety				
1 Matters connected with the fencing and construction of machinery				
(a) Moulds, horizontal injection moulding machines	75	6	36	6
(b) Moulds, compression moulding machines	23	1	3	1
(c) Moulds, blow moulding machines	3	2	3	2
(d) Moulds, expanded polystyrene moulding machines	3	1	2	1
(e) Rotational moulding machines	1	–	1	–
(f) Farming machines	2	–	2	–
(g) Granulators	5	1	4	1
(h) Welding machines (including radio frequency and ultrasonic)	4	–	3	–
(i) Mixing machines (including high speed, tumbler and ribbon machines	15	–	9	–
(j) Haul-off units	2	–	1	–
(k) Others	13	6	12	6
2 Use of electricity	2	2	2	2
Notification and records				
1 Re examination of air receiver	1	–	1	–
2 Safety Policy	1	–	1	–
Health				
1 Cleanliness – general provision	1	–	1	–
2 Precautions against inhalation or contact with dust, fume, vapour, gas or other toxic substances	3	1	2	1
Fire				
1 Storage of cellular foam	7	–	7	–
2 Matters connected with use of flammable liquids	7	–	7	–
3 Matters connected with storage of flammable liquids	5	–	5	–
Welfare				
Washing facilities	1	–	1	–
Total	**174**	**20**	**103**	**20**

Leather industries

	Number of notices served		*Number of recipients*	
	I/N	*P/N*	*I/N*	*P/N*
Safety				
1 Matters connected with the fencing and construction of machinery				
(a) Closing motion of feed roll to multi-roll machines	13	–	8	–
(b) Plating machines worn shaft and roller carriage	3	–	3	–
(c) Tannery drum	2	–	2	–
(d) Transmission machinery	4	2	4	2
(e) Others	2	1	2	1
2 Floors	2	–	2	–
3 Use of crane	–	1	–	1
Fire				
Matters connected with use of flammable liquids	1	–	1	–
Total	**27**	**4**	**22**	**4**

Footwear industries

	Number of notices served		*Number of recipients*	
	I/N	*P/N*	*I/N*	*P/N*
Safety				
1 Matters connected with the fencing and construction of machinery	5	1	3	1
2 Use of electricity	3	–	3	–
Total	**8**	**1**	**6**	**1**

Prosecutions, proceedings instituted by HMFI on which hearings were completed in 1980

Plastics industries

	No of cases	*No of informations*	*Convictions*	*Average penalty per information laid*
				£
Safety				
1 Matters concerned with the fencing and construction of machinery				
(a) Moulds, horizontal injection moulding machines	2	2	2	250
(b) Others	7	8	8	175
2 Use of electricity	2	4	4	200
3 Training of operators	1	1	1	300
Fire				
1 Re dust explosion risk	1	1	1	1000
2 Protective equipment and clothing	1	1	1	200
3 Hours of employment	1	3	3	25
Total	**15**	**20**	**20**	**2150**

Footwear industries

	No of cases	*No of informations*	*Convictions*	*Average penalty per information laid*
				£
Safety				
Use of lift	1	5	1	200

Appendix 4

Bibliography

Publications	*Publisher*
BS 5304 British Standard Code of Practice Safeguarding of Machinery	British Standards Institution Sales Department 104 Pentonville Road London N1 9ND
Council of Europe Resolution A.P(69)7 Safety of Workers in the use of certain tannery machinery and equipment	Council of Europe
Code of Practice for Revolution Cutting Presses	Footwear Joint Industry Safety Committee SATRA House Rockingham Road KETTERING Northamptonshire
Solvents and Adhesives, a Code of Practice	Footwear Joint Industry Safety Committee SATRA House Rockingham Road KETTERING Northamptonshire
Code of Practice for Safeguarding of Horizontal Injection Moulding Machines	The British Plastics Federation 5 Belgrave Square London SW1X 8PH
Code of Practice – Safety in the Use and Construction of Granulators for Working Plastics	The British Plastics Federation 5 Belgrave Square London SW1A 8PH
The Safe Use of Powdered and Fibrous Additive Materials in the UK Plastics Processing Industry	The British Plastics Federation 5 Belgrave Square London SW1X 8PH
Code of Practice for safety in the use of rotational moulding machines	The British Plastics Federation 5 Belgrave Square London SW1X 8PH
Health at Work	The British Plastics Federation 5 Belgrave Square London SW1X 8PH
Second Tripartite Technical Meeting for the Leather and Footwear Industry –	
(a) General Report (ISBN 92-2-102196.3)	International Labour Office Geneva
(b) The Employment Implications of Technological Choice and of Changes in International Trade in the Leather and Footwear Industry (ISBN 92-2-10219613	International Labour Office Geneva
(c) The Effects of Technological Progress on Working Conditions and Working Environment in the Leather and Footwear Industry (ISBN 92-2-102198X)	International Labour Office
Health and Safety Executive Guidance Note EH15/79 "Threshold Limit Values for 1979"	HMSO
Code of Practice – Safeguarding of Tannery Drums	Leather Producers Association King's Park Road Moulton Park Northampton NN3 1JD
Safeguarding of multi-roller machines used in the leather producing industry	Leather Producers Association King's Park Road Moulton Park Northampton NN3 1JD
Health and Safety in the Plastics and Rubber Industries (ISBN 0-903107-28-7)	The Plastics and Rubber Institute 11 Hobart Place London SW1 0HL
Evaluation of the Carcinogenic Risk of Chemicals to Humans – Wood, Leather and some Associated Industries (ISBN 92-8-321225-8)	International Agency for Cancer Research

Publications	*Publisher*
Safety and Health at Work – Report of The Committee 1970-72 Chairman – Lord Robens Command 5034	HMSO
Health and Safety Executive Guidance Note EH/23 (Anthrax Health Hazards)	HMSO
Code of Practice Safe Handling of Dyestuffs in Colour Stores	HMSO
Code of Practice for Reducing the exposure of employed persons to noise	HMSO
Acheson ED Cowdell R M and Jolles B	British Medical Journal 1970 385-393
Nasal Cancer in the Northamptonshire Boot and Shoe Industry	

Appendix 5

Area offices of the Health and Safety Executive

Area	*Address*	*Telephone number*	*Local Authorities within each area*
1 **South West**	Inter City House, Mitchell Lane Victoria Street, Bristol BS1 6AN	0272 290681	Avon, Cornwall, Devon, Gloucestershire, Somerset, Isles of Scilly
2 **South**	Priestley House, Priestley Road, Basingstoke RG24 9NW	0256 3181	Berkshire, Dorset, Hampshire, Isle of Wight, Wiltshire
3 **South East**	3 East Grinstead House, London Road, East Grinstead, West Sussex RH19 1RR	0342 26922	Kent, Surrey, East Sussex, West Sussex
4 **London NW**	Chancel House, Neasden Lane, London NW10 2UD	01-459-9955	Barnet, Brent, Camden, City of London, Enfield, Ealing, Hammersmith, Harrow, Hillingdon, Hounslow, Kensington & Chelsea, City of Westminster
5 **London NE**	Maritime House, 1 Linton Road, Barking, Essex 1G11 8HF	01-594 5522	Barking, Hackney, Haringey, Havering, Islington, Newham, Redbridge, Tower Hamlets, Waltham Forest
6 **London South**	1 Long Lane, London SE1 4PG	01-407 8911	Bexley, Bromley, Croydon, Greenwich, Kingston, Lambeth, Lewisham, Merton, Richmond, Southwark, Sutton, Wandsworth
7 **East Anglia**	39 Baddow Road, Chelmsford, Essex CM2 0HL	0245 84661	Essex except the London Boroughs in Essex covered by Area 5; Norfolk, Suffolk
8 **Northern Home Counties**	14 Cardiff Road, Luton, Beds LU1 1PP	0582 34121	Bedfordshire, Buckinghamshire, Cambridgeshire, Hertfordshire
9 **East Midlands**	Belgrave House, 1 Greyfriars Northampton NN1 2BS	0604 21233	Leicestershire, Northamptonshire, Oxfordshire, Warwickshire
10 **West Midlands**	McLaren Bldg, 2 Masshouse Circus, Queensway, Birmingham B4 7NP	021 236 5080	West Midlands
11 **Wales**	Brunel House, 2 Fitzalan Road, Cardiff CF2 1SH	0222 497777	Clwyd, Dyfed, Gwent, Gwynedd, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan
12 **Marches**	The Marches House, Midway Newcastle-under-Lyme, Staffs ST5 1DT	0782 610181	Hereford and Worcester, Salop, Staffordshire
13 **North Midlands**	Birkbeck House, Trinity Square, Nottingham NG1 4AU	0602 40712	Derbyshire, Lincolnshire, Nottinghamshire
14 **South Yorks & Humberside**	Sovereign House, 40 Silver Street, Sheffield S1 2ES	0742 739081	Humberside, South Yorkshire
15 **W & N Yorks**	8 St Paul's Street, Leeds LS1 2LE	0532 446191	North Yorkshire, West Yorkshire
16 **Greater Manchester**	Quay House, Quay Street, Manchester M3 3JB	061-831 7111	Greater Manchester
17 **Merseyside**	The Triad, Stanley Road, Bootle L20 3PG	051-922 7211	Cheshire, Merseyside
18 **North West**	Victoria House, Ormskirk Road, Preston PR1 1HH	0772 59321	Cumbria, Lancashire
19 **North East**	Government Buildings, Kenton Bar, Newcastle-upon-Tyne NE1 2YX	0632 869811	Cleveland, Durham, Northumberland, Tyne & Wear
20 **Scotland East**	Belford House, 59 Belford Road, Edinburgh EH4 3UE	031-225-1313	Borders, Central, Fife, Grampian, Highland, Lothian, Tayside and the island areas of Orkney & Shetland
21 **Scotland West**	314 St Vincent Street, Glasgow G3 8XG	041-204 2646	Dumfries and Galloway, Strathclyde, and the Western Isles

Printed in the UK for HMSO
Dd 715362 C30 10/83